

Enhancing practice

Research-Teaching Linkages: enhancing graduate attributes

Sector-Wide Discussions
Volume I

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Volume I

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Preface

The approach to quality and standards in higher education (HE) in Scotland is enhancement led and learner centred. It was developed through a partnership of the Scottish Funding Council (SFC), Universities Scotland, the National Union of Students in Scotland (NUS Scotland) and the Quality Assurance Agency for Higher Education (QAA) Scotland. The Higher Education Academy has also joined that partnership. The Enhancement Themes are a key element of a five-part framework, which has been designed to provide an integrated approach to quality assurance and enhancement. The Enhancement Themes support learners and staff at all levels in further improving higher education in Scotland; they draw on developing innovative practice within the UK and internationally. The five elements of the framework are:

- a comprehensive programme of subject-level reviews undertaken by higher education institutions (HEIs) themselves; guidance is published by the SFC (www.sfc.ac.uk)
- enhancement-led institutional review (ELIR), run by QAA Scotland (www.qaa.ac.uk/reviews/ELIR)
- improved forms of public information about quality; guidance is provided by the SFC (www.sfc.ac.uk)
- a greater voice for students in institutional quality systems, supported by a national development service - student participation in quality scotland (sparqs) (www.sparqs.org.uk)
- a national programme of Enhancement Themes aimed at developing and sharing good practice to enhance the student learning experience, facilitated by QAA Scotland (www.enhancementthemes.ac.uk).

The topics for the Enhancement Themes are identified through consultation with the sector and implemented by steering committees whose members are drawn from the sector and the student body. The steering committees have the task of establishing a programme of development activities, which draw on national and international good practice. Publications emerging from each Theme are intended to provide important reference points for HEIs in the ongoing strategic enhancement of their teaching and learning provision. Full details of each Theme, its steering committee, the range of research and development activities as well as the outcomes are published on the Enhancement Themes website (www.enhancementthemes.ac.uk).

To further support the implementation and embedding of a quality enhancement culture within the sector - including taking forward the outcomes of the Enhancement Themes - an overarching committee, the Scottish Higher Education Enhancement Committee (SHEEC), chaired by Professor Kenneth Miller, Vice-Principal, University of Strathclyde, has the important dual role of supporting the overall approach of the Enhancement Themes, including the five-year rolling plan, as well as institutional enhancement strategies and management of quality. SHEEC, working with the individual topic-based Enhancement Themes' steering committees, will continue to provide a powerful vehicle for progressing the enhancement-led approach to quality and standards in Scottish higher education.



Norman Sharp
Director, QAA Scotland

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Foreword

This Enhancement Themes project - Research-Teaching Linkages: enhancing graduate attributes - has over the last two years asked institutions, departments, faculties, disciplines, staff and students to reflect on the intended outcomes of HE, and has examined how links between research and teaching can help develop 'research-type' graduate attributes. The 'attributes' in question are the high-level generic attributes that are necessary to allow our graduates to contribute to and thrive in a super-complex and uncertain future where the ability to question, collate, present and make judgements, quite often with limited or unknown information, is increasingly important; key attributes, it is argued, that are necessary for our graduates to contribute effectively to Scotland's civic, cultural and economic future prosperity.

The Enhancement Theme adopted a broad, inclusive definition of research to embrace practice/consultancy-led research; research of local economic significance; contributions to the work of associated research institutes or other universities; and various types of practice-based and applied research including performances, creative works and industrial or professional secondments.

The Enhancement Themes comprise one sector-wide project and nine disciplinary projects: Physical sciences; Information and mathematical sciences; Arts, humanities and social sciences; Health and social care; Business and management; Life sciences; Creative and cultural practice; Medicine, dentistry and veterinary medicine; and Engineering and the built environment. The aim of the projects was to identify, share and build on good and innovative practice in utilising research-teaching linkages to enhance the achievement of graduate attributes at the subject level. The sector-wide project comprised an ongoing discussion within and between Higher Education Institutions, involving staff and students reflecting on and exploring research-teaching linkages, how they can be structured and developed to achieve 'research-type' attributes, and how students are made aware of the nature and purpose of these in order to fully articulate and understand their achievements as graduates.

Research-Teaching Linkages: enhancing graduate attributes has provided the sector with a focus for reflection on the nature and outcomes of HE - along with the opportunity to develop a rich array of resources and supportive networks to add to the student learning experience and enable our graduates to contribute effectively to Scotland's future.

Professor Andrea Nolan

Chair, Research-Teaching Linkages: enhancing graduate attributes
Vice-Principal Learning and Teaching, University of Glasgow

I Executive summary

I.1 Background

The principal focus of this Enhancement Theme was to gain a better understanding of how research-teaching linkages can foster graduate attributes. The Enhancement Theme entailed 10 projects, various consultations and an associated series of conferences, seminars and workshops. Nine projects explored discipline-based perspectives (see Appendix 3), while the sector-wide project focused on the institutional level. The latter project sought to promote institutional and sector-wide dialogue and encourage exchange of perspectives on the definition, understanding and exemplification of research-teaching linkages. It also sought to explore the relationship between research-teaching linkages and the development of graduate attributes.

The brief for the sector-wide discussion placed the focus on taught programmes and how, at institutional and programme level, links between research strategies, activities, outputs and processes could support student learning and enable the development of key research-oriented graduate attributes.

In terms of defining graduate attributes we readily acknowledge that the language used to describe student development is fraught with inconsistencies in terms of use and meanings. Terms such as attributes, skills, competencies and abilities are often used interchangeably. Not only is this the case between different constituencies but also within them. This report does not claim to resolve these inconsistencies but rather clarify for the reader the definition used in this context.

Barrie (2004, p 262) defines graduate attributes as being 'the skills, knowledge and abilities of university graduates, beyond disciplinary content knowledge, which are applicable to a range of contexts'. A significant amount of research has been undertaken, predominantly in Australia, to look at how higher education institutions (HEIs) can use the concept of graduate attributes to be more transparent and explicit about how students can expect to develop throughout their higher education learning experience. An important dimension of graduate attributes that is, arguably, less obvious when talking about skills, is the extent to which it enables inclusion of values and behaviours as well as technical abilities. This latter dimension raises a different set of issues, particularly in relation to teaching and assessment. However, interpreting graduate attributes in this way provides a richness to the debate and begins to capture the transformational elements of the higher education experience. This in turn, raises more fundamental questions about the role of a university education in today's society. This report focuses on the extent to which research-teaching linkages develop specific attributes in students.

I.2 Approach

The project was founded on the twin pillars of institutionally-based discussions facilitated and supported by the designated institutional contacts, and a series of sector-wide opportunities for reflection and sharing via conferences, seminars and workshops.

The project directors actively supported both strands of the approach. In addition to meeting regularly with institutional contacts and having dialogues with them via email, a framing tool was made available in April 2007 (see Appendix 1) to assist the internal deliberations within HEIs.

The primary locus of the discussions around the sector-wide dimensions of the Enhancement Theme rested with each HEI. This was supported by opportunities for cross-institutional dialogue and reflection through the vehicle of the various conferences and seminars. In parallel there was a series of discipline-based projects. These focused on a different structural level and organisational orientation. The interface with the sector-wide project is largely captured where the institutional approach highlights the course/programme contribution. HEIs were requested to provide vignettes of research-teaching linkages and these feature in Volume 2 of the sector-wide report. They are included not only to illustrate the richness of activities but also to provide illustrations of activities which are closely connected to the learning experience of students.

Another component of the methodology was the distillation by the project team of key pointers from the literature and the efficient incorporation of that material into sector-wide workshops, seminars and conference presentations.

1.3 Findings

Institutional approaches

In seeking to measure the readiness of HEIs to embed research-teaching linkages into their current practices the survey identified a rich range of approaches in current use. These can be categorised under the following seven dimensions.

Procedural/structural

The structural mechanisms, such as course approval procedures, that are in place to encourage and monitor research-teaching linkages.

Contractual/reward mechanisms

The incentives or reward structures that are in place to encourage staff to become involved in developing research-teaching linkages.

New policies/strategies

The institutional policies and strategies that are in place to drive the development and embedding of research-teaching linkages.

Engagement

How the HEI is drawing attention to, and encouraging staff and student engagement with, research-teaching linkages and their assessment.

Organisational direction

To what extent research-teaching linkages go with the current 'direction of travel' of the HEI, in terms of its vision, plans and aspirations.

Enhancing graduate attributes

Whether the HEI is developing policies and strategies for the development (and assessment) of graduate attributes distinctive to the HEI, and the degree to which there are potential synergies with the development of research-teaching linkages.

Disciplinary cultures

The extent to which disciplinary cultures within the HEI might foster or inhibit the development of effective research-teaching linkages.

To help develop a systematic process, and to complement the framing tool used to open institutional conversations on research-teaching linkages, a simple audit tool was developed (see Appendix 2) to measure these seven dimensions.

Illustrations of these seven dimensions of practice are provided in Section 4 of this report (Institutional findings) and further examples of Scottish approaches to research-teaching linkages are collected as Volume 2 (*Vignettes of practice*) of the sector-wide report.

Numerous examples of research-teaching linkages could be provided at the level of courses and programmes, doubtless many more than the number which feature in institutional reports, or are mentioned later in this report or in Volume 2.

Potential barriers to institutional readiness

The institutional reports from the sector-wide project confirm that much valuable work is now under way identifying and adopting effective practice in terms of research-teaching linkages, and promoting the graduate attributes that arise from such activities. However, a number of barriers to institutional readiness in regard to research-teaching linkages also became apparent. These include:

- a dislocation of teaching and research locally
- research undertaken in centres exclusively devoted to research, where there are no teaching responsibilities
- a need for moves to ease pressure on researchers in the next iteration of the Research Excellence Framework (REF)
- a need to find routes to recognise and reward pedagogical research activity in schools/faculties/departments
- staff inexperienced in research and employed on teaching contracts of 20-plus hours a week
- the fact that Research Councils UK does not expect research grant allocations to recognise the value of research application to teaching (such as that in place with the National Science Foundation in the USA)
- a potentially unhelpful problem of division of responsibility between teaching and research at vice-principal level
- a need to encourage staff participation in cross-institution interest groups (the 'silo' problem)
- the fact that there is a greater awareness of research-teaching linkages in the teaching community than in the research community

- occasional dilemmas of leadership for heads of department in relation to conflicting allegiances at the meso level
- 'imperative fatigue' - research-teaching linkages as 'another thing to do'
- need for greater staff confidence in articulating the theme.

What also emerges from many of the institutional reports is a tension across the sector between implicit practice regarding research-teaching linkages and systematic practice. The comment of one institutional contact would probably have a broad relevance across the sector:

There would appear to be a range of effective and innovative practice going on at the university, however there is no apparent systematic approach. Innovation for the most part would appear to come from visionary staff who have sought to go beyond what is merely necessary. While this is not really surprising and is a reflection of innovative practice in many walks of life, perhaps it is worth exploring what support and resource is necessary to facilitate innovation in learning and teaching more widely, particularly with regard to research-teaching linkages.

Systematic approaches may imply greater regulation, which may stifle innovation and be resented, especially in a scholarly community. However, frameworks might be useful to help reduce the cognitive burden of 'reinventing the wheel'.

There are as yet no well-established monitoring mechanisms apparent and formal structures of support for research-teaching linkages are only just getting under way across the sector, instigated to some extent by this Enhancement Theme. If research-teaching linkages, along with the duly recognised, though informal, quality support are valued, it would seem worthwhile to formulate some sort of systematic but flexible approach that could help ensure a consistency of approach and quality across all programmes.

Emerging synergies

Engagement with the Enhancement Theme has grown and deepened progressively. This is reflected in institutional reports and also in the interest which has been shown by the wider international community, both at international conferences and through specific invitations to project members to present or act in an advisory capacity in Norway, Ireland, New Zealand and Australia.

Prior to the current Enhancement Theme, no other enquiries into research-teaching linkages had considered such linkages at a system level, and in terms of how such linkages resonate with other priorities, such as graduate attributes. Current debate in the Scottish sector, reflected in the interim report of the Joint Future Thinking Taskforce *New Horizons: responding to the challenges of the 21st Century* (2008), makes several references to the research and knowledge creation roles of Scottish universities, to their common commitment to Magna Carta Universitatum 1988 (which recognises the indivisibility of teaching and research), and to ensuring that through development of intellectual attributes and skills university graduates constitute a vital component of the knowledge-based economy and workforce - a key component of government policy. The interim report further observes that 'Scottish universities develop higher level skills requiring a learning experience that is research-informed and train most of the professionals who work in Scotland in science and engineering, health, education and a wide range of other fields' (p 6). Reference is made to other synergies elsewhere in this report.

The principal reasons for the selection of this Enhancement Theme and the primary objectives of the Theme were formulated in the scoping study and refined at the initial meetings of the Steering Committee. These deliberations paid attention to work already undertaken elsewhere; to growing interest in the potential utility of exploring and reporting on the range of research-teaching linkages in operation; of how such linkages were defined and understood and of how these contributed to the cultivation of attributes in graduates which would enable them to contribute effectively to knowledge-based economies; and to societal and community needs in an era of increasing complexity and diversity.

Actions and initiatives from HEIs

HEIs were invited to submit an institutional report on Enhancement Theme-related activities and these reports conveyed a strong sense of engagement and recognition of potential connections with earlier Enhancement Themes, notably those on The First-Year Experience, on Employability and on Assessment.

Institutions were free to adopt their own approach to the processes of discussion and consultation. Some sought to generate a wide spectrum of potential engagement; others favoured using the key elements of the organisational structure or targeting specific groups (including students). At least one HEI undertook a benchmarking exercise.

Every HEI experienced an initial challenge in surfacing the range of interpretations of the Enhancement Theme. Once that had occurred engagement appeared to follow fairly readily, and agendas emerged and were developed. For example:

- pursuing excellence
- specifying graduate attributes
- aligning procedures
- making research-teaching linkages more explicit
- winning the commitment of staff
- sharing initiatives
- connecting with external agendas.

Generally, those consulted warmed to the use of the term 'graduate attributes', preferring that to what some viewed as narrower connotations associated with the term 'skills'.

Institutional contacts welcomed the freedom to decide on the ways in which the Enhancement Theme was operationalised within the HEI. That benefit should not be under-estimated. However, it does mean that care must be taken when generalising about the findings since they were never intended to be exhaustive or comprehensive. Rather, they should be seen as celebrating diversity, honouring selectivity and representing work in progress.

Illustrations of initiatives at the institutional level include the White Space Initiative at The University of Abertay Dundee, the '94 Group benchmarking initiative at Heriot-Watt, and the role of the Caledonian Academy at Glasgow Caledonian University. Edinburgh College of Art, Napier University and the University of the West of Scotland referred to aligning the work on the Enhancement Theme with revised procedures for course specification. Many HEIs operate devolved academic structures. Often that meant that

the emphasis in the institutional report lay at the level of course/programmes and/or at the meso-level (college/faculty/school). In terms of the latter, Aberdeen, Dundee, Edinburgh and Glasgow stressed consultation with, and responses from within, the colleges/faculties. At Aberdeen, for example, directors of learning and teaching across the schools were consulted, along with colleagues from other disciplines within those schools. Having recently abolished the faculty structure, the University of Stirling emphasised the importance of the role of the Director of Teaching and Learning in each department.

Most HEIs probably asked challenging questions. That was certainly transparent in some reports. Part of the purpose of such an approach is to enable issues to be aired as well as successes to be celebrated.

The key findings were as follows:

- wide ranging good practice and evidence of research-teaching linkages were found, although systematic practice could be developed further
- several HEIs were developing explicit statements of graduate attributes
- generally, there was less evidence of a structured approach to using research-teaching linkages to develop graduate attributes
- some distinctive challenges surround the delivering of research-teaching linkages to develop graduate attributes in practice-based curricula
- there was little evidence of student involvement in, or knowledge of, the process of linking research and teaching or, even more significantly, its purpose
- reward structures do not necessarily encourage innovative work in research-teaching linkages
- certain barriers and issues considered in the scoping study were, to a degree, confirmed, namely:
 - a tendency for the research community not to engage in learning and teaching developments
 - no established discourse to help staff articulate linkages between research activity, teaching and student learning
 - consideration of workload on respondents and key individuals within HEIs
 - negative effect of the Research Assessment Exercise (RAE) on promoting research-teaching linkages
 - difficulty for HEIs in demonstrating strategic linkages between research in teaching.

1.4 Conclusions and recommendations

- Valuable dialogues on ways of enhancing understandings of research-teaching linkages have been aided by the opportunity provided by the Enhancement Theme.
- Clear links between research and teaching are well established in the later years of undergraduate programmes and this project and the discipline-based projects have also learned of an extensive raft of examples of similar links in classes which occur in the early years of the undergraduate curriculum.

- Not only does the phrase 'graduate attributes' resonate fairly comfortably with the values of the academic community, but there is growing evidence of HEIs, or parts thereof, defining the attributes which they expect their graduates to possess. In many professional programmes there are varying degrees of professional body prescription of key attributes required for registration or programme validation/accreditation.
- The sector-wide information generated is both encouraging and distinctive in the sense that much of the previous work on research-teaching linkages has focused primarily at the localised level. As a result the Enhancement Theme has produced a distinct contribution to existing knowledge which should be of interest both to Scottish HEIs and to universities and researchers based in other countries.
- The conversations on research-teaching linkages have been rich and diverse. That diversity should be celebrated. Nonetheless, HEIs, in seeking to advance dialogues and consider what further steps might be worthwhile and appropriate in relation to policies, structures, resources and practices, might find it helpful to reflect on the use of the classification of 'dimensions of readiness' offered in Section 4 of this report. These being: procedural/structural; contractual/reward mechanisms; new policies/strategies; engagement; organisational direction; graduate attributes; and disciplinary cultures.
- Consideration should be given to ways of encouraging localised actions - at the level of the department/programme/discipline - to promote effective research-teaching linkages while securing productive alignment with institutional discussions about and policies on graduate attributes.
- Attention also needs to be paid to the levers which might be used to foster effective research-teaching linkages, including organisational practices (such as programme reviews and specification templates) and suitable supportive educational and staff development initiatives.
- The momentum of the Enhancement Theme and related work at institutional, discipline and sectoral levels should be maintained and nurtured. This might be achieved through future enhancement framework initiatives, either by an extension of the current theme, or through an explicit strand in a future synoptic theme. There has been discernible enthusiasm for and engagement with this Enhancement Theme but there is scope for further engagement and for progressing dialogues, reflections, evaluations and consequential adjustments to policies and practices, structures and mechanisms. As part of that ongoing commitment the sector should continue to stay alert to, and connect with, similar initiatives and debates in other parts of the world, for example in Australia and Ireland.
- There were indications from a number of institutional reports that academic staff believed that students often lacked an understanding of the processes of linking research and teaching, and how these correlate to and foster the key attributes and skills which employers seek and expect. This probably merits further testing through interviews with staff and students. However, that should not delay action within HEIs directed towards assisting students to recognise, understand and value the intended relationships. Central components of such strategies will involve greater explicitness with regard to the role of research-teaching linkages in the curriculum and coherent communication both of overall objectives and of the

role of specific learning processes and intended outcomes. It is recommended that HEIs strengthen policies and practices directed at the latter.

- The topic of research-teaching linkages is attracting attention in several countries. It is recommended that a focused booklet is produced which distils some of the key dimensions and findings from international studies.

1.5 Issues

The scale, discipline mixture and balance, and structural organisation of research activities influenced institutional discussions. As the reports from the discipline-based projects clearly demonstrate, there are substantial inter-disciplinary differences in the definitions of, perspectives on, the language used to describe and the practice used to promote research-teaching linkages and the development of graduate attributes.

The influence of strong research cultures and identities brings an added layer of complexity for HEIs wishing to develop frameworks for the development of graduate attributes at an organisational level. Academic staff can become caught between dual allegiances to their HEI and to their disciplinary community of practice. Sensitive issues can arise in terms of academic authority when the nature and direction of graduate development, and the nature of disciplinary pedagogic practice and tradition, are debated. As Jenkins (2008) has noted in his overview of the discipline-based projects of the Enhancement Theme, there is a strong perception that current efforts to forge research-teaching linkages are being driven primarily from the 'teaching side' of course teams and departments.

The institutional reports suggest that institutional mission influences the prevailing interpretations of research-teaching linkages, although that generalisation is complicated by the differing paradigmatic dispositions of disciplines, as amply evidenced by the reports from the discipline-based surveys. It is impossible to tell from the data whether intra-institutional variation in interpretation and practice is greater or lesser than broad inter-institutional differences. It is likely that both co-exist.

A major challenge surrounds the largely implicit, almost tacit, nature of individually-held views on research-teaching linkages. This was neatly captured in one report where a respondent compared articulating the linkages to what he termed the 'oxygen' problem, implying that the linkages were simply taken for granted as part of the institutional environment and culture and were no more consciously thought about than one would consciously think about the air one was breathing. Further issues arise from problems which some academics have in agreeing the role research should play in directly contributing to all undergraduate learning and teaching, and from the 'silo' problem, which is a structural problem reported in a number of the HEIs where an unhelpful separation or compartmentalisation of teaching and research through contracts, professional activities and other structural mechanisms is apparent.

Challenges arose too in relation to rewarding levels of engagement by staff in research-teaching linkages. Recognising the accumulative progression of attribute development from level 7 to level 10 (broadly years 1 to 4) remains problematic, as do systematic approaches to both the evaluation and assessment of research-teaching linkages. Questions of resourcing to sustain research-teaching linkages activity, staff development and, in some HEIs, research capacity building, will also need to be addressed.

There can be tensions for staff and students with the implication that higher education is primarily about the development of employability skills. The phrase 'graduate attributes' attracts support but the evidence suggests there can be significant differences of opinion and understanding of the precise meaning of the term, how attributes should be developed, where responsibility for that primarily rests, and what standards of performance should be expected at different stages in the study cycle of an undergraduate.

An audit tool (see Appendix 2) has been constructed to help HEIs explore their position and aspirations in relation to research-teaching linkages. As explained more fully later in this report, the tool is intended to enable HEIs to consider the extent to which the prevailing approaches are systematic and whether any preference for a local action could be enhanced by overarching mechanisms and structures.

1.6 The road ahead

The institutional reports from the sector-wide project confirm that much valuable work is now under way in terms of identifying and adopting effective practice in research-teaching linkages and promoting the graduate attributes that arise from such activity. A number of issues remain to be addressed as the Enhancement Theme takes hold and is implemented more widely.

Evaluating progress

A question remains at this stage as to how we know if research-teaching linkages in HEIs are successful at module or programme level, or if research-type graduate attributes are being developed at module or programme level. As a result there is a need to identify approaches that would help determine whether research-teaching linkages are effective. We need also to consider how we would set about monitoring such measures of effectiveness.

Organisational approaches will need to focus on finding ways of integrating and linking different imperatives across large HEIs, as well as finding ways of communicating cross-campus practices in ways which engage staff who are not already involved.

In these processes academic development units will have a role to play (and will need sufficient time) in evaluating the impact of both specific examples and the general culture as part of the students' disciplinary, research, personal and professional development. They could also usefully investigate how well our current practices and policies in assessment and recording achievement (including personal development planning (PDP)) are articulated with the development of graduate attributes.

Academic staff approaches

Academic staff approaches will need to focus on the development of creative ways of authentically aligning the research priorities of the disciplines with the needs of undergraduate learning. Authenticity is important because of the need (expressed and believed by the academics interviewed so far) to acknowledge the importance of maintaining the integrity of what students experience. This means recognising and valuing the nuances between curriculum developments that are primarily pedagogical in nature and those which genuinely explicate research-oriented attribute acquisition.

These are not necessarily separable approaches but the priorities in the former might not always be the same as those in the latter.

There is a need to provide appropriate institutional framing which enables coherence while encouraging high levels of local flexibility and ownership. The development of graduate attribute frameworks is an explicit attempt to achieve that alignment. The discipline-based projects provide illustrations of action within communities of practice.

Links with the First-Year Experience Enhancement Theme: raising the status of first-year teaching

As the outcomes from the Research-Teaching Linkages Enhancement Theme accumulate, it is becoming apparent that the gains sought in relation to the first-year experience could in part be addressed by wider adoption of some more explicit research-teaching linkages. This needs to be explored further as the outcomes and dissemination of the research-teaching linkages theme continues. Possibilities could be explored between groups responsible for the first-year experience, research-teaching linkages and PDP to maximise the gains available.

Synergies between the Research-Teaching Linkages Enhancement Theme and the First-Year Experience Enhancement Theme have already been identified in terms of attempting to achieve:

- an emphasis on success
- engagement (not just retention)
- empowerment
- personalisation
- the strong influence of peers
- students as co-creators of their own learning experience
- a desire to be challenged
- ways of overcoming isolation and boredom factors
- promotion of research skills for later professional roles
- a higher status for first-year teaching
- making large classes feel smaller.

A progressive continuum - fostering 'research-mindedness' early

Within all of these endeavours there is a real need to recognise the potential to emphasise and value different attributes at different times depending on student and subject learning needs. This can seem insurmountable within a highly modularised system, yet it is clear that academic staff have a sense of what is possible in level 7 (year 1) and 10 (year 4) programmes and also what is necessary in levels 7 and 8 to enable progression into honours. The Enhancement Theme disciplinary report for the physical sciences argued that a departmental or institutional approach would ensure that 'the self-nucleating islands of activity and innovation that naturally appear do not remain isolated, but thrive as part of a coherent strategy. We are often concerned with examining programmes and activities horizontally (across a course, module or year of

study) but it is harder to look vertically for themes that develop and progress through the programmes'.

The emphasis from the Steering Committee of the Research-Teaching Linkages Enhancement Theme has always been that engaging students from the outset in research-type activities (for example enquiry-based approaches to learning, critiquing research papers, generating research information, debating issues) gives first-year students more responsibility for, and control over, their own learning outcomes. It is also likely to improve their transition experience, be it from schools or from other educational backgrounds. At a time when students are increasingly spending less time on campus it may also go some way in connecting them more closely to their learning environment. It may also facilitate a more intensive approach to individual feedback and allow students to become increasingly involved in the creation of content and encourage self-directed learning.

Heeding the student voice

The work undertaken by both the sector-wide project and the discipline-based projects suggests that students frequently do not fully understand how research-teaching linkages can help foster important graduate attributes. The identity and benefit of linkages can remain tacit within curricula and need to be 'surfaced' and recognised by students so that they can better articulate the nature of their own achievements and development at later stages in their careers. Student associations in Scottish HEIs would be useful and willing allies in such an endeavour. Of course, a number of HEIs consulted with sabbatical officers and other student representatives as part of their deliberations in support of this Enhancement Theme. The next step may be to give thought to how that range of involvement could be effectively widened and deepened.

Forging alliances with other initiatives and maintaining momentum

Graduate attributes were a major focus of the Enhancement Theme. Many Scottish HEIs have specific policies and initiatives aimed at addressing the development of key graduate attributes. Indeed, many HEIs have been working on such issues for some time, with recent catalysts including the Employability Enhancement Theme and Scottish Funding Council (SFC) financial support for a post in each Scottish HEI dedicated to employability coordination activities. This latter SFC initiative provides a timely opportunity and valuable resource in each Scottish HEI to take forward the work of identifying, assessing and recording achievement of graduate attributes that have been developed through research-teaching linkages. This is a potentially productive partnership that should be strongly encouraged.

As stated within the report it will be important to maintain the momentum of this Enhancement Theme and nurture the interest it has generated on a continuing basis. Future enhancement framework initiatives offer possible opportunities in this regard, through extending the work of the current theme or by integrating dimensions of it into an explicit strand of a future synoptic theme that might attempt better understanding of the notion of 'the effective graduate' or 'the effective learner'.

1.7 Endnote

As is widely recognised, this is both a challenging and an exciting time for higher education. The nature of higher education, as well as its demographics, is changing amid an environment of increasing complexity, uncertainty, speed and risk. And of course students themselves are changing. The current generation arrives in our HEIs with considerably different mindsets from their predecessors. The secondary school sector in Scotland has already signalled its early engagement with preparing students to achieve their aspirations in an increasingly internationalised and unpredictable world. The four dimensions of Learning Teaching Scotland's *Curriculum for Excellence*¹ are designed 'to create a curriculum that will enable all young people to become confident individuals, successful learners, effective contributors and responsible citizens' (Learning Teaching Scotland 2007).

Higher education can build on this foundation. As in earlier periods of university learning, our varied missions as higher education providers retain a commonly agreed purpose to help prepare our students as best we can, not only to cope with the challenges of the professional and cultural worlds that they will encounter, but to succeed and thrive in them, as employees and as responsible members of society.

¹ Available at: www.ltscotland.org.uk/curriculumforexcellence

2 Introduction and background

2.1 Scoping the Enhancement Theme

In line with now established practice, work on this Enhancement Theme was informed by a scoping study which was submitted to the Scottish Higher Education Enhancement Committee (SHEEC) in March 2006. That study drew upon views expressed at consultative workshops held in September and November 2005 and January 2006. Those consultations demonstrated enthusiasm for the proposed Enhancement Theme, interest in both institutional policies and the link to graduate attributes, and a desire for a broad, inclusive definition of research. Subsequent deliberations and discussions at SHEEC and with the Scottish Funding Council (SFC) led to the formation of the Steering Committee chaired by Professor Andrea Nolan (University of Glasgow), refinement of the scoping of the Enhancement Theme, the call for tenders and the appointment of the consultants for each project. Work on this project commenced in early 2007.

The scoping study and other inputs to the Steering Committee identified work undertaken elsewhere on related dimensions of research-teaching linkages (for example, Healey 2005; Jenkins et al 2007; Griffith 2004; Brew 2006; Barrie 2007; Henkel 2004; and Boyer 1990 and 1998). While recognising the relevance and importance of that work in informing the articulation of the Enhancement Theme through the various projects, the intention throughout was to make a distinctive addition to the understanding of the complex views on research-teaching linkages and relationships to graduate attributes by generating grounded insights drawn from all Scottish HEIs.

2.2 Pointers to the literature

There is a burgeoning literature internationally concerning research-teaching linkages. A representative review of the generic literature is available from the Enhancing the Teaching-Research Nexus project at Lancaster University, led by Paul Trowler and Terry Wareham (2007a)². Trowler and Wareham point out that 'Three literatures in this area have developed, but largely in isolation from each other'. They characterise these broadly as:

- linkages between disciplinary differences and research practices. For example: Donald (1995); Becher (1989); and Becher and Trowler (2001)
- linkages between disciplinary differences and teaching and learning practices. For example: Hativa and Marincovich (1995); and Neumann et al (2002)
- the nature of the teaching-research nexus. For example: Ramsden, P and Moses, I (1992); Neumann (1994); Jenkins, A and Zetter, R (2003); Robertson and Bond (2001); and Brew (1999).

It should also be noted that a number of commentators - for example, Barnett, R and Coate, K (2005) and HEFCE (2000) - have not found convincing research-teaching linkages. In conducting the current Enhancement Theme we have drawn mainly from

² Available at www.lancs.ac.uk/fass/projects/nexus/outputs

the third corpus of literature, including work recently produced by the Higher Education Academy - Jenkins (2004); Jenkins and Healey (2005); and *Academy Exchange* (Issue 2: Autumn 2005).

An important emphasis for us has been provided by Krause's Knowledge Transfer Conceptual Framework (Krause 2007), which warns against the dangers of polarisation between research and teaching. Krause argues the need to acknowledge emerging conceptions of knowledge transfer, 'third stream' activities and notions of 'public scholarship'. This is in keeping with the influential work on changing modes of research, including a contemporary shift to publicly commissioned, team-based, applied and shorter duration 'mode 2' research by Gibbons et al (1994).

In contrast, the concept of 'public scholarship' has received less debate in the UK. Krause refers to public scholarship as occurring when universities engage 'in reciprocally beneficial ways with communities at local, national and international level' (p 5). It is more commonly discussed in the USA where it has grown out of 'service learning' and is related to Boyer's concept of the 'scholarship of engagement' (Boyer 1990).

Krause's paper, as well as her project website for this area of enquiry (Krause 2008), emphasises the need to recognise the wide range of activities in which many academics, and their students, are engaged in the twenty-first century. If knowledge transfer is to become embedded in national and institutional policy, then there is an imperative to ensure that the theory and practices associated with knowledge transfer and third-stream activities promote, rather than impede, the integration of teaching, research and scholarship in higher education.

During the study we have taken heed of different categorisations of the teaching-research nexus, such as the model below developed by Griffiths (2004 p 722).

Research-led

- The curriculum is structured around subject content.
- The content selected is directly based on the specialist research interests of teaching staff.
- Teaching is based on a traditional 'information transmission' model.
- The emphasis is on understanding research findings rather than research processes.
- Little attempt is made to capture the two-way benefits of the research-teaching relationship.

Research-oriented

- The curriculum places emphasis as much on understanding the processes by which knowledge is produced in the field as on learning the codified knowledge that has been achieved.
- Careful attention is given to the teaching of inquiry skills and on acquiring a 'research ethos'.
- The research experiences of teaching staff are brought to bear in a more diffuse way.

Research-based

- The curriculum is largely designed around inquiry-based activities, rather than on the acquisition of subject content.
- The experiences of staff in processes of inquiry are highly integrated into the student learning activities.
- The division of roles between teacher and student is minimized; the scope for two-way interactions between research and teaching is deliberately exploited.

Research-informed

- Teaching draws consciously on systematic inquiry into the teaching and learning process itself.

Figure 1: Categorisations of the teaching-research nexus (from Griffiths 2004)

Healey (2005) adapted this model, using two axes to identify four approaches to linking teaching and research. The first axis distinguishes the extent to which students are treated as the audience or as participants, while the second axis classifies the approach as emphasising research content or research processes and problems.

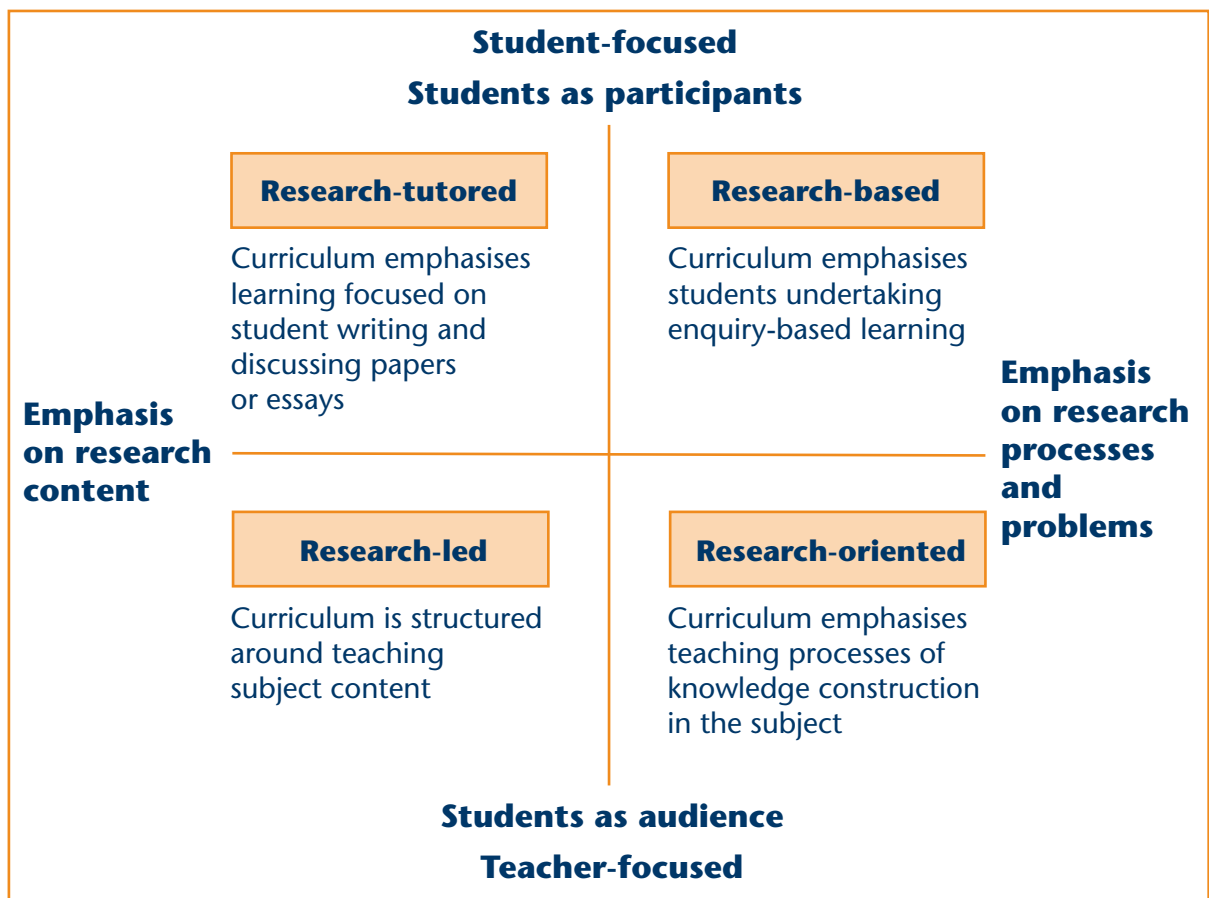


Figure 2: Curriculum design and the research-teaching nexus (from Healy 2005)

In the light of this we have put more emphasis on research processes and problems than on research content. We have concentrated more on the research-based curriculum quadrant of Healey's model, which emphasises students undertaking enquiry-based learning, and the research-oriented curriculum, which emphasises teaching processes of

knowledge construction in the subject. These have been emphasised to some extent over the research-led curriculum structured around teaching subject content, and the research-tutored curriculum which emphasises learning focused on students writing and discussing papers or essays, where it might prove harder to identify the development of graduate attributes. This is in keeping with the findings of Kuh recent large-scale study of 'high impact activities' that are likely to foster student engagement. In this study 'undergraduate research' was identified as a high impact activity but principally where students were actively engaged in practices such as 'designing studies', 'reviewing literature' and 'analysing and interpreting data' rather than 'collecting data' (Kuh 2008).

The work of both Krause and Healey suggests that where academics are engaged together rather than separately the opportunities to develop synergies may be enhanced. Their work indicates the need for further studies on the extent to which academics' teaching, research, knowledge transfer (for example, consultancy) and public scholarship activities can and do overlap. It would appear that such synergies exert a unifying effect on the four strands of scholarship identified in Boyer's influential model, namely the scholarships of discovery, integration, application and teaching (Boyer 1980). Operating across the entire framework of the Griffiths and Healey models - and in the modes of public scholarship emphasised by Krause - might serve both to demonstrate and integrate Boyer's four strands into a relational framework. This, in effect, would seem to implement the approach advocated by Boyer.

Colbeck (1998) has argued that research and teaching are probably easier to integrate where a broader and more inclusive definition of what counts as research is adopted. Hence we have put due emphasis on a broad and inclusive definition of research in this sector-wide study. As Brew reminds us, however:

We need greater clarity about precisely which aspects of research and scholarship academics are focusing on. It is important to be clear what we mean by research, what we understand by scholarship and how these ideas are related to conceptions of knowledge and approaches to teaching.... Different ideas about the nature of research, scholarship, teaching and knowledge have different consequences. (Brew 2003 p 5.)

In the light of this, the nine discipline-based Enhancement Theme reports provide a useful source for understanding these 'different ideas about the nature of research, scholarship, teaching and knowledge'. The Steering Committee of the Enhancement Theme adopted an intentionally wide view of how research might be defined which, in addition to the more familiar notion of 'RAE-returnable' activity, included:

- practice/consultancy-led research
- research of local economic significance
- contributions to the work of associated research institutes or other universities
- various types of practice-based and applied research including performances and creative works
- industrial or professional secondments
- the kinds of 'research-minded' investigation and analysis undertaken by students in enquiry-based and problem-based learning activities.

Trowler and Wareham raise important questions in terms of the extent to which research-teaching linkages might be more influenced by departmental cultures or disciplinary cultures. Which of these dimensions might be more amenable to change remains a problematic issue. As they observe:

The multiple cultural configuration (Alvesson 2002) of one institution (say an ex-polytechnic or community college) will be quite different from that of another (say an elite university) and this will be very significant indeed for the ideological configuration found there and hence for 'the nexus' itself. The prospects for change and the most appropriate dimensions of the nexus that might be the focus for change efforts in these two contexts will be quite different. In some contexts some dimensions will be amenable to change, in other contexts those will be rigid and very difficult to shift. (Trowler and Wareham 2007b, p 9.)

In relation to the pedagogy of disciplines, Cousin (2007) has drawn attention to the potential of research into Threshold Concepts (for example, Meyer and Land (2006); Land, Meyer and Smith (2008)) to open up a three-way 'transactional curriculum inquiry' among subject specialists, students and educational researchers. This approach, she argues, encourages disciplinary practitioners to probe more deeply into the conceptual nature of their discipline in order to formulate the best way of teaching and learning it.

By staging the exploration at the site of the subject and of its difficulties, threshold concept research promises to harness an academic's research curiosity for his subject with a new curiosity about how best to teach it; this promise carries with it an enhanced capacity for research and teaching to be dynamically linked. (Cousin 2007 p 6.)

Finally, a valuable influence on the effect that the graduate attributes dimension has on the research-teaching linkages has come from the work of Barrie (2004, p 262). He defines graduate attributes (as understood in the Australian context) as being 'the skills, knowledge and abilities of university graduates, beyond disciplinary content knowledge, which are applicable to a range of contexts'. A significant amount of research has been undertaken, predominantly in Australia, to look at how institutions can use graduate attributes to be more transparent and explicit about how students can expect to develop.

3 Approach and methodology

3.1 Aims

This sector-wide project was based upon a combination of individual institution-based discussions, ideas and practices which institutions wished to share, expert inputs which were designed to inform discussions and promote debate, sector-wide opportunities for reflection and dissemination and inputs from the project directors (for example, a framing tool was made available at an early stage for possible use by HEIs to aid internal conversations and consultations).

The project also undertook a selective search for pointers from the literature (see section 2.3) and sought to identify connections to the discipline-based projects.

This work was guided by the project specification which sought identification and sharing of good practice; encouragement of engagement with the Enhancement Theme by staff and students; generation of effective ideas and approaches to innovation; areas for further work; and related recommendations addressed to various stakeholder constituencies.

The focus was on taught programmes and how, at institutional and programme level, links between research strategies, activities, outputs and processes could support student learning and enable the development of key research-oriented graduate attributes. At undergraduate level potential illustrations of such attributes included:

- critical understanding
- awareness of the provisional nature of knowledge
- how knowledge is created, advanced and renewed
- an ability to analyse problems and issues, and to formulate, evaluate and apply evidence-based solutions and arguments
- an ability to apply a systematic and critical assessment of complex problems and issues
- an ability to appropriately deploy techniques of analysis and enquiry
- familiarity with advanced techniques and skills
- inventiveness and creativity in formulating, evaluating and applying evidence-based solutions and arguments
- an understanding of the need for a high level of ethical, social, cultural, environmental and wider professional conduct.

At master's level the illustrative list of desirable attributes included:

- conceptual understanding that enables critical evaluation of current research and advanced scholarship
- originality in the application of knowledge
- the ability to deal with complex issues and make sound judgement in the absence of complete data.

The sector-wide project, in line with the other projects in the Research-Teaching Linkages Enhancement Theme, encouraged the adoption of an inclusive interpretation of research to encompass Boyer's four scholarships - discovery, integration, application and teaching. Through the research-teaching nexus, the project also encouraged HEIs to embrace, where appropriate, the following:

- practice
- consultancy
- individual or professional secondments
- creative works
- applied research including performances
- studies of local economic and cultural significance as part of their investigation of, and discussion on, research-teaching linkages and the connections to the development of research-associated graduate attributes.

3.2 Cornerstones of the approach

One cornerstone of the approach was the reliance placed upon institutional discussions and the inputs from those via a report from each institutional contact. The second key element involved several sector-wide events which provided opportunities for wider engagement, reflection, exploration and dissemination. The third component arose from work undertaken by the project directors to support these two strands and to assist the sector-wide discussions. Specific illustration of those inputs include the framing tool that was made available to all institutional contacts in April 2007, and the more recent development of an audit tool to assist institutions as they sustain the momentum, and progress dialogue, articulation and implementation of strategies, policies and practices. There was also input from sector-wide conferences in March and November 2007 and March 2008, and from the regular seminars and discussions with institutional contacts.

3.3 Strengths of the methodology

The principal strengths of the methodology used, which was primarily shaped by the ethos stated in the brief, were that it enabled institutions to determine how the internal discussions occurred, what they entailed, how these were captured and reported, and what should feature as successes, issues, interests and areas for continuing involvement. Those opportunities were universally welcomed by institutions and the reward was a rich variety of perspectives. The challenge for the project directors was to discern patterns from the 20 responses and to provide some means of shaping and grouping them. The way that challenge was addressed is presented in *Sector-Wide Discussions, Volume 2: Vignettes of practice*³.

Persuasive arguments could be made for a methodology that encouraged greater commonality of coverage in the institutional discussions. However, since the brief emphasised the encouragement of broad perspectives and contextualised interpretations, the approach adopted seemed more appropriate. It appeared to meet positively with institutional preferences and produced some results which might not

³ Volume 2 is available at www.enhancementthemes.ac.uk/publications

necessarily have emerged from a more prescriptive methodology. For example, a number of institutions identified synergy between the Research-Teaching Linkages Enhancement Theme and earlier themes such as the First-Year Experience, Employability or Assessment⁴.

3.4 A degree of alignment fostered by the framing tool

A number of institutions made use of the framing tool (see Appendix 1) generated early in the project as a supporting device, which may have enabled a degree of convergence on coverage of the topic. Nonetheless, substantial differences occurred in terms of the approach favoured for consultation and/or discussion and the scale, range and nature of the engagement of those involved in the processes (see Volume 2).

3.5 Engagement with the Enhancement Theme

Another encouraging and positive aspect of the way the Enhancement Theme functioned in this phase was the interest evident both in the levels of the attendance and engagement with sector-wide events. Institutional reports referred to the ways and extent to which the discussions stimulated curiosity and attracted active participation from staff (and often students).

⁴ Available at www.enhancementthemes.ac.uk/publications

4 Institutional findings

4.1 Potential barriers to institutional readiness

Institutional reports from the sector-wide project confirmed that much valuable work is now under way in terms of identifying and adopting effective practice in research-teaching linkages, and promoting the graduate attributes that arise from such activities. However, a number of barriers to institutional readiness in regard to research-teaching linkages also became apparent. These include:

- a dislocation of teaching and research locally
- research undertaken in research centres where there are no teaching responsibilities
- a need for moves to ease pressure on researchers in the next iteration of the Research Excellence Framework (REF)
- a need to find routes to recognise and reward pedagogical research activity in schools/faculties/departments
- staff inexperienced in research and employed on teaching contracts of 20-plus hours a week
- the fact that Research Councils UK does not expect research grant allocations to recognise the value of research application to teaching (such as that in place with the National Science Foundation in the USA)
- a potentially unhelpful problem of division of responsibility between teaching and research at vice-principal level
- a need to encourage staff participation in cross-institution interest groups (the 'silo' problem)
- the fact that there is a greater awareness of research-teaching linkages in the teaching community than in the research community
- occasional dilemmas of leadership for heads of department in relation to conflicting allegiances at the meso level
- 'imperative fatigue' - research-teaching linkages as 'another thing to do'
- need for greater staff confidence in articulating the theme

What also emerges from many of the institutional reports is a tension across the sector between implicit practice regarding research-teaching linkages and systematic practice. The comment of one institutional contact would probably have a broad relevance across the sector:

There would appear to be a range of effective and innovative practice going on at the university, however there is no apparent systematic approach. Innovation for the most part would appear to come from visionary staff who have sought to go beyond what is merely necessary. While this is not really surprising and is a reflection of innovative practice in many walks of life, perhaps it is worth exploring

what support and resource is necessary to facilitate innovation in learning and teaching more widely, particularly with regard to research-teaching linkages.

Systematic approaches may imply greater regulation, which may stifle innovation and be resented, especially in a scholarly community. However, frameworks might be useful to help reduce the cognitive burden of 'reinventing the wheel'.

There are as yet no well-established monitoring mechanisms apparent and formal structures of support for research-teaching linkages are only just getting under way across the sector, instigated to some extent by this Enhancement Theme. If research-teaching linkages, along with the duly recognised, though informal, quality support are valued, it would seem worthwhile to formulate some sort of systematic but flexible approach that could help ensure a consistency of approach and quality across all programmes.

4.2 Seven dimensions of readiness

For such an approach to come about it would be helpful to have a measure of the degrees of institutional readiness for furthering research-teaching linkages at any given time. As a way of gauging the prevailing state of academic transformation it would be helpful to know, more specifically, the degrees of curriculum readiness, staff readiness, student readiness and also employer readiness, in terms of current employer expectations and attitudes.

What emerged from the data in the institutional reports were seven key dimensions which seemed to assist effective institutional furthering of research-teaching linkages:

Procedural/structural

The structural mechanisms, such as course approval procedures, that are in place to encourage and monitor research-teaching linkages.

Contractual/reward mechanisms

The incentives or reward structures that are in place to encourage staff to become involved in developing research-teaching linkages.

New policies/strategies

The institutional policies and strategies that are in place to drive the development and embedding of research-teaching linkages.

Engagement

How is the HEI drawing attention to, and encouraging staff and student engagement with, research-teaching linkages and their assessment.

Organisational direction

To what extent research teaching-linkages go with the current 'direction of travel' of the institution, in terms of its vision, plans and aspirations.

Enhancing graduate attributes

Whether the HEI is developing policies and strategies for the development (and assessment) of graduate attributes distinctive to the HEI, and the degree to which there are potential synergies with the development of research-teaching linkages.

Disciplinary Cultures

The extent to which disciplinary cultures within the HEI might foster or inhibit the development of effective research-teaching linkages.

To help develop a systematic process, and to complement the framing tool used to open institutional conversations on research-teaching linkages, a simple audit tool was developed (see Appendix 2) to measure these seven dimensions. It should be noted also that if these dimensions are used as dimensions of audit, they too might serve to reveal the location and nature of further barriers to the development of research-teaching linkages. However, it is recommended that institutions might benefit from using the audit tool, or a similar instrument, to gauge their own degrees of readiness against these criteria.

A number of examples of interesting practice have been provided by HEIs in Scotland to indicate the actions and planning they are undertaking in relation to these 'seven dimensions of readiness'.

4.3 Procedural/structural

University of Strathclyde - implementation and monitoring procedures

The activities of the University's Academic Policy Committee include ensuring effective links to the strategic plan and faculty strategies for learning, teaching and assessment. It will be responsible for ensuring the implementation of the University's response to the current Research-Teaching Linkages Enhancement Theme as appropriate.

One particular activity during academic years 2007/8 and 2008/9 will be the implementation of a new undergraduate framework for courses. Each department will be required to review its offerings in order to conform to the new framework. All undergraduate degree regulations will be revised by late 2008 in preparation for the new framework to come into operation in session 2009-2010. This will provide a possible opportunity to include explicit reference to research-teaching linkages and class level.

The activities of the Student Experience Committee include generic student skills, employability and PDP. It will therefore similarly be responsible for ensuring that graduate attributes resulting from research-teaching linkages are explicit in the student experience.

The Quality Monitoring Committee, with its quality monitoring function, has responsibility for departmental and course reviews. Departmental reviews follow a number of guidelines and cover broad areas of research, teaching and management. It is possible that the Quality Monitoring Committee will have responsibility for the explicit recognition of the current Research-Teaching Linkages Enhancement Theme during departmental review. In conclusion, it can be seen that the academic decision-making process has elements of both top-down and bottom-up direction, with much devolvement to the faculties and departments (a process which can be time-consuming). In addition, responsibility for this theme covers three main sub-committees of Senate (at least from the academic perspective).

Napier University - module descriptor requirements

Napier University is moving to a system of 20 credit modules from September 2008 and all modules are currently under review for validation. As part of this process, the section on the module descriptor form requiring a description of 'learning, teaching and assessment approach' asks that research-teaching linkages should be addressed in all descriptors seeking validation.

University of Dundee - professionalism and employability toolkit

Current initiatives are being used to 'piggyback' research-teaching linkages and graduate attributes on to existing development plans. These include college learning and teaching development plans which are currently under development.

A professionalism and employability toolkit has also been developed which supports staff in auditing curricula for 'employability', 'professionalism' and 'graduate attributes'. This is due to be implemented in 2008 and has already been promoted at an internal employability and professionalism event

Edinburgh College of Art - major re-description of all undergraduate programmes

At a validation event which took place in April 2008, a number of new measures were approved which will lead to the continued enhancement of the student experience at Edinburgh College of Art. Research-teaching links were specifically addressed as per the College's strategic plan.

The validation panel approved a major re-description of all undergraduate programmes in art and design at Edinburgh College of Art. As a result, from the start of academic year 2008-09, all levels in all programmes in art and design will have named research modules integrated within them. On the College's module database there are now 53 modules with research as a key word, including 29 with research in the actual module title. In addition, the College-wide standard feedback form given to students now includes research as a category requiring comment.

These changes grow out of curriculum developments that actually precede the current Enhancement Theme. Research-oriented undergraduate modules have been in existence for a number of years in certain programmes. These were piloted variously in drawing and painting, sculpture and combined studies and are now extended across the whole range of art and design provision. Examples of learning outcomes from a range of modules would include the following:

Learning outcomes example 1

On completion of this module, students will be able to:

- use a variety of practical and theoretical methods to demonstrate an exploration of research themes
- demonstrate an awareness of the wide range of socio-cultural, ethical and technical considerations which influence the practice of design
- demonstrate a developing relationship between their studio work and personal research.

Learning outcomes example 2

On completion of this module, students will be able to:

- research and reason a critical understanding of the key theories, practices and methods that inform the project and employ a specialist range of research applications and sources
- creatively analyse and synthesise the complex results of the research
- demonstrate a professional ability to manage, structure, resolve and communicate an individual innovative research project.

Scottish Agricultural College - steps to enhancement of research-teaching linkages

Among the approaches to improve research-teaching linkages across the spectrum of Scottish Agricultural College courses, staff suggested:

- greater use of study visits to institutes/organisations/businesses of relevance to the particular course
- make better use of staff in the Research and Development and Consultancy Services divisions. This would require a comprehensive and easily accessible database of staff expertise across the College
- ensure that full use is made of links with the relevant industry
- consider internal publication of student research, for example from honours projects
- encourage student attendance at appropriate conferences. These could be external or internal and could include student attendance at internal research/consultancy seminars, journal clubs etc
- increase the amount of student-centred, enquiry-based learning across courses.

University of the West of Scotland - programme specifications and module descriptors

It is normal at the University of the West of Scotland for level outcomes to include explicit research outcomes. Some programme specifications such as BA Social Policy are models in this regard. Similarly, many module descriptors (at all levels) also focus on specific assessment requirements or student activities that explicitly require the student to undertake research. For example, BA (Hons) Social Policy:

The core level 9 module Social Issues and Policy Responses attempts to develop and reinforce a theme dominant in the level 7 and 8 modules relating to the contested nature of social policy. Prominent 'social problems' of the day, such as begging, youth behaviour, poverty and welfare entitlement are examined in terms of the competing policy solutions proffered by political interests, think tanks and other policy actors. The third and fourth year programmes offer students an opportunity to explore a range of policy fields in more detail such as criminal justice policy, health care, community care policy, housing policy, pensions as well as comparative analysis. Study at levels 9 and 10 is supported by a module that seeks to improve the student's research literacy and prepare them for undertaking a dissertation in their final year.

University of Stirling - department-based directors of teaching and learning

The University of Stirling has removed faculty structures from the University, devolving to departments a number of functions previously mediated at faculty level. The Research-Teaching Linkages Enhancement Theme was being introduced to the University as these changes were taking place, and department-based directors of teaching and learning (DTLs) are now central to the process of driving Enhancement Themes.

While address of the Research-Teaching Linkages Enhancement Theme has followed a timescale dictated by adjustment to new organisational circumstances, the DTL system considerably intensifies the University's ability to sustain and grow its involvement with earlier themes, and is starting likewise to prove of benefit to institutional engagement with the research-teaching linkages initiative. In essence, where the prior University structure engaged groups of departments collectively through an associate dean function addressing teaching/learning and research matters, the University now has 20 directors dealing with teaching/learning issues at departmental level, likewise bringing Enhancement Themes to departments on an individual basis. The research director function is also thereby localised.

As well as embedding themes more thoroughly across the University, the present structure also allows, in the context of research-teaching linkages developments, wider scope for a range of responses.

4.4 Contractual/reward mechanisms

Glasgow Caledonian University - rewarding evidence-based learning and teaching

Aside from developing new approaches to learning and teaching, rewarding staff for innovation is a key priority at Glasgow Caledonian University. Promotions criteria have been aligned with the University's Continuing Professional Development (CPD) framework as they seek to encourage and reward an evidence-based approach to learning and teaching. A core aspect of the new CPD programme is the Caledonian scholars scheme, led by the Caledonian Academy. This scheme aims to promote and support scholarly activity in learning and teaching across the University, moving towards a culture of teaching underpinned by research. In addition, the University's promotions criteria have been reviewed to reward excellent teaching underpinned by scholarly activity. This shift in focus serves not only to improve the alignment of research and teaching, but will encourage educational research within disciplines that can be submitted to the next iteration of the Research Assessment Exercise.

The importance of rewarding teaching and fostering good research-teaching linkages is especially evident in areas where research and teaching are carried out by different groups of staff. For instance, in the School of Nursing, Midwifery and Community Health, the great majority of discipline research is carried out within a research centre. Teaching responsibilities are assumed by teaching staff, and research funding can become misaligned with curriculum needs running the risk of research and teaching becoming dislocated. Steps are being taken to ensure effective alignment of research and teaching. Through performance annual review, individual staff are encouraged to

reflect on ways in which research informs teaching, thereby encouraging teaching staff to engage in research and researchers to enhance teaching.

Queen Margaret University - academic promotion and the use of expertise in research-teaching linkages

At Queen Margaret University the criteria for academic promotions that are specifically related to senior lecturer provide a broad definition of teaching and scholarship (one of the three sets of criteria) that emphasises both the assimilation and use of subject knowledge. By incorporation of 'the use of...' into the criteria, the emphasis is on transfer from research activities into the learning and teaching domain.

However, the structure of the application form for promotion does categorise research strengths and teaching strengths into different sections, and this is something that the University considers it might usefully review as an institution in the future.

The Robert Gordon University - academic career paths

The institutional context at the Robert Gordon University (RGU) presents challenges associated with change management; in particular changes that challenge notions of academic identity and role. There are related challenges in terms of definitions of research and scholarship, perceptions of status, and staff career policy. However, this context also presents opportunities to explore the concept of subject-scholarship, raising the profile and practice, and focusing on application and impact on student learning and graduate attainment. This will include a need to define excellence in subject-scholarship. Given that a basic level of subject-scholarship is an expectation of all teachers at RGU, the University is considering how it might define, encourage, recognise and reward outstanding performance. This question is currently being considered within a project considering academic career paths.

The professional and vocational nature of provision at RGU mean that an important dimension of subject-scholarship will be how knowledge and practice are advancing in the profession and workplace, and how this might be linked to current curricula. This is likely to lead to complex and mixed economies within course teaching teams, with combinations of researchers, subject-scholars and visiting professionals.

4.5 New policies/strategies

University of Edinburgh - collegiate teaching and learning strategies

The University of Edinburgh's strategic plan (2004-2008) stresses excellence in research and teaching and refers to the production of graduates equipped for high personal and professional achievement. Those goals are enabled at various levels.

The three colleges play a significant role in the University's devolved academic structure. From 2006/7 each college has been developing a teaching and learning strategy. There is also central support through procedures (for example, teaching programme reviews), structures (such as an employability steering group which is defining generic graduate attributes at various levels) and units/aspects of provision (such as the postgraduate transferable skills unit or the postgraduate certificate led by the teaching, learning and assessment centre).

At the University the institutional contact used a questionnaire with senior staff in the colleges to gather views on, and examples of, research-teaching linkages. Further surveys were planned to access views of students and a wide raft of staff. Examples of research-teaching linkages were also distilled from teaching programme reviews.

University of Aberdeen - the curriculum reform project

The curriculum reform (CRef) project at the University of Aberdeen is a review of the University's educational objectives, programme structures and curriculum content, with a view to developing a high quality and distinctive educational experience for undergraduate and postgraduate students at the University, which takes account of developing international approaches and is relevant for the twenty-first century.

As part of the CRef process, a group has been set-up with the specific remit to examine the role of research in the curriculum. Membership of this group includes the QAA institutional contacts for the Research-Teaching Linkages Enhancement Theme. The group has received many papers and reports as a consequence of the participation of the University of Aberdeen, showing how research-teaching linkages can be conceived. This report and further research results will also be presented to the group as part of its ongoing work.

Edinburgh College of Art - integrated academic strategy

The College has a learning and teaching strategy, a research strategy and a quality enhancement strategy. When the College came to develop an employability strategy, it was realised that greater strategic integration was needed. As a result, the new College strategic plan now outlines a need for an integrated academic strategy. This is now in process, with completion planned for January 2009.

Heriot-Watt University - institutional discussion project

The current draft (March 2006) of the learning and teaching strategy (2006-2011) for Heriot-Watt notes that:

The 'synergies between research, teaching and scholarship' further define the Heriot-Watt approach: although such linkages are not presently documented as institutional policy, the perception that intellectual curiosity and independent learning add value to the student learning experience, the University and its graduates is an important aspect of the University's culture.

The importance of research-teaching linkages is highlighted through the selection of 'research-informed teaching' as a strategic project for the University.

The QAA theme on enhancing research-teaching linkages, and the institutional discussion project in particular, is timely in that it offers the chance to look at what is happening in the University and to influence the strategic direction at a time when all University strategies are being reviewed and reshaped to reflect the University mission, and when all modules are being scrutinised as part of restructuring the academic year.

Research-teaching linkages are the first stage in the Heriot-Watt cycle. The first stage reviews current research-teaching linkages practices both externally and internally, before entering planning, implementing and evaluation stages (see figure 3).

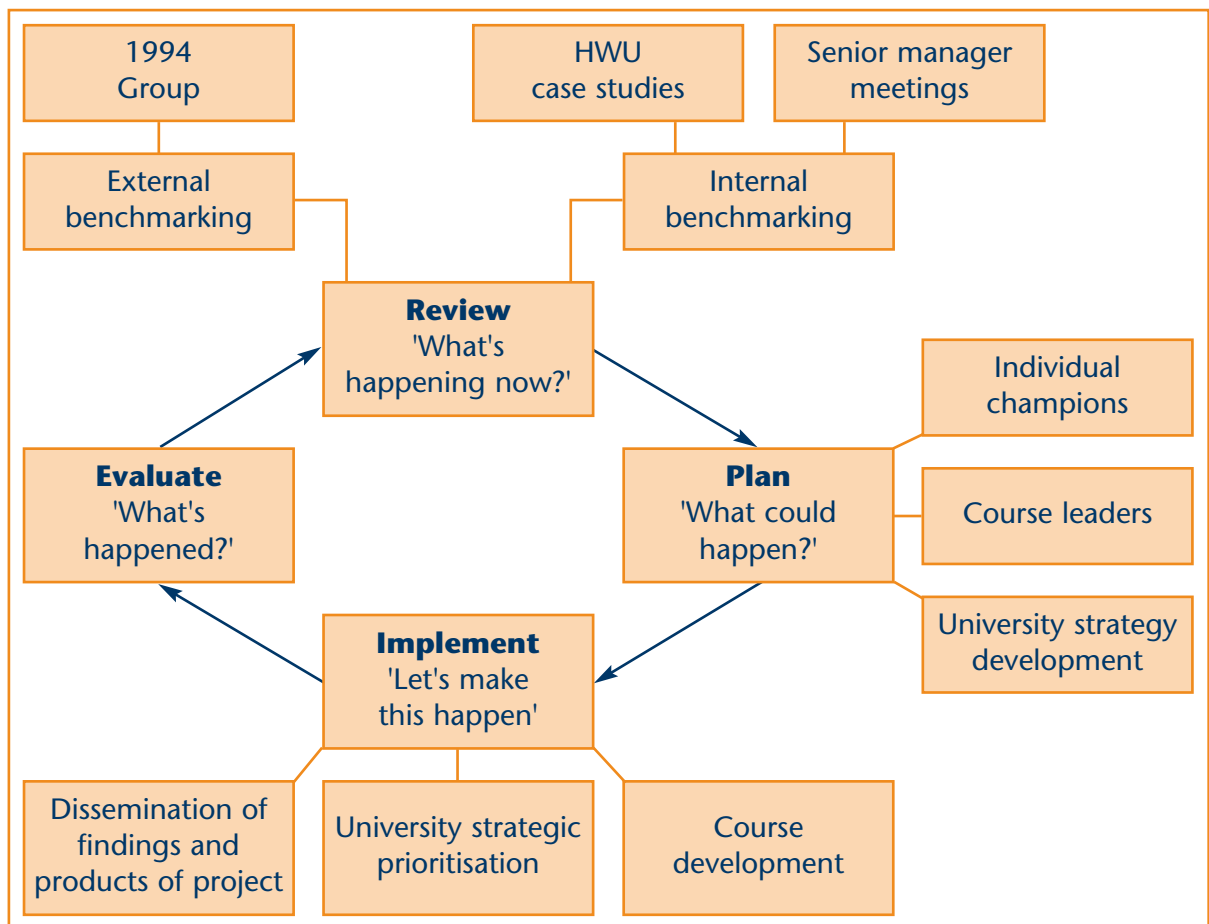


Figure 3: Research-teaching linkages project cycle, Heriot-Watt University

4.6 Engagement

Napier University - a cycle of engagement for research-teaching linkages

On 24 May 2007 a workshop was given on research-teaching linkages at the University Management Forum (vice-principals, deans, heads of schools and associate deans) with briefing to a further layer in the University's organisation.

On 20 June 2007 Dr Simon Barrie from the University of Sydney visited the university to talk about research-teaching linkages and its links with graduate attributes. This was facilitated through staff development and open to all members of staff.

During June and July 2007 a collection of case studies on research-teaching linkages was elicited from lecturers who are active and explicit in incorporating research-teaching linkages into their teaching.

In August 2007 the student president was consulted about incorporating student views into the research-teaching linkages material and agreement reached to pull together a focus group from the student office bearers who would talk about their conception of research-teaching linkages and their place within the institution.

On 4 September 2007 a university-wide debate on research-teaching linkages was held and a report published⁵. The University's vice-principals awarded £100 book tokens for the most robust research-teaching linkages case study from each faculty, as judged by a panel consisting of associate deans and educational development staff.

In January 2008 a compendium of all the case studies gathered was published. This compendium has forewords by the Senior Vice-Principal, Professor Mick Healey, the Research-Teaching Linkages Steering Committee representative and the institutional contact giving both national and Napier University specific perspectives on the background to and value of this Enhancement Theme. This publication is available to all University staff and is also available as a PDF⁶.

In January 2008 a staff conference was organised under the title: Linking research and teaching to enhance learning.

University of Aberdeen - postgraduate workshop

The University of Aberdeen's generic skills training programme for postgraduate research students (ASPIRE) included a workshop on teamwork and presentation skills, in which the students were asked to make presentations addressing a variety of questions. This was used as an opportunity to find out what these postgraduates (PGRs) considered to be the most important aspects of learning and teaching in a research-active institution. While the prime purpose of the exercise was developing teamwork skills, the exercise was used as an opportunity to find out the PGRs' perspectives for the research-teaching linkages survey by asking the secondary question:

You have been given a teaching role with level 7 students. You intend to give them the best learning experience ever! As a researcher, what special 'extra' can you bring to this teaching role, to make the learning experience better for these first years?

The PGRs were able to provide a list of the kinds of activities they felt the undergraduate students would benefit from (presumably based on their own experiences), such as mini-projects (as specifically opposed to 'just labs'). They also mentioned their ability to empathise with the undergraduates' situation, but they did not suggest anything in their presentations that was distinctive as being delivered by someone active in research. However, when there was a discussion with all the teams at the end of the presentations, there was broad agreement that one important thing that they had learnt from research was that they felt they were much better able to spot where things could go wrong (for example, during research design) and deal with things when they did go wrong, such as diagnose what happened and come up with solutions.

In general they felt their experience meant they were able to handle failure and guide undergraduates through that process. Their perception was that failure of experimental design, failure of equipment, and failure of reliability of data (for example) are all aspects of research activity that one has to learn to manage, but that this is not necessarily as much of a bad thing as undergraduates perceive it to be. In fact the PGRs considered these kinds of failures to be authentic research experiences and the process of moving beyond them as an important experience that undergraduates should learn and with which they could help.

⁵ The report on the debate, written by Shirley Earl can be found at www.napier.ac.uk/ed/journal

⁶ Available at: www2.napier.ac.uk/ed/staffconference/jan2008/publications.htm

University of Aberdeen - learning and teaching enhancement programme

The University's learning and teaching enhancement programme (LTEP) was created to encourage the introduction of new enhancement activities into teaching, and to disseminate good practice throughout the institution, by the provision of small grants which are available on a competitive basis. The LTEP is run by the centre for learning and teaching and was first introduced to strengthen the First-Year Experience Enhancement Theme in early 2007. As part of the Research-Teaching Linkages Enhancement Theme activities, a further call was made in early 2008.

Members of staff were invited to consider ways in which they might enhance the role of research in teaching in any aspect of the undergraduate experience of students. The 14 applications submitted demonstrated that there was a diverse range of imaginative thinking coming from staff on how they could enhance the role of research in learning and teaching.

Four projects were selected for funding⁷:

- Temporary Ordination in Second Life: Divinity and Religious Studies; School of Divinity, History and Philosophy
- use of portable citation tool for study and knowledge acquisition: Geography and Environment; School of GeoSciences
- use of interactive maps for student-led research: Geography and Environment; School of GeoSciences
- student-led literature and science exhibition at Marischal Museum⁸; English; School of Language and Literature

University of Dundee - new University newsletter

In conjunction with the Director of Quality Assurance, a new University newsletter, *Highlighter*, focusing on current issues and agendas in teaching quality enhancement and educational development, has been launched. The newsletter, produced in both hard copy and as an online PDF document, is aimed at academic staff, senior administrators and students' association sabbatical officers.

One of the key aims of *Highlighter* is to create a one stop shop where colleagues are able to access the latest information on enhancement-related issues in teaching and learning, or find out how to access that information, in order to raise awareness of and support engagement with the quality enhancement themes (QET) and the enhancement agenda in general. Each edition has a QET update page, a quality assurance news section and a 'for your diary' section with information on QET-related events.

In addition, work is ongoing to establish a dedicated area on the new staff development website for research-teaching linkages, as a sub-page of the existing QET area⁹. This is designed to attract and engage colleagues.

⁷ Available support was limited to four projects.

⁸ Marischal Museum is one of the University of Aberdeen's seven museums. It is used for research and teaching, is open to the public, and specialises most notably in Egyptian and Classical antiquities, non-Western ethnography, Scottish prehistory and numismatics. Its collection ranks alongside the largest in Scotland.

⁹ See: www.dundee.ac.uk/ppd/apd/qualitythemes.htm

This site will not only host information on University of Dundee-based and external events, resources and links in relation to research-teaching linkages but will adopt a more ambitious objective of providing a platform to host discussion and debate around research-teaching linkages and to explore and examine 'what the institution (staff and students) understands by graduate attributes/dispositions and how the acquisition and application of these are enhanced through the curriculum, teaching, learning and assessment activities and the learning environment'.

University of Dundee - working with staff and students on research-teaching linkages

Modes of engaging both staff and students at the University of Dundee have included the following initiatives:

Participants on the Postgraduate Certificate in Teaching in Higher Education programme are being encouraged to engage with the topic of research-teaching linkages and the development of graduate attributes as part of their personal learning plan and to explore the issues within the specific context of their discipline and their practice.

As regards working with students, a cash prize competition for undergraduates to produce posters on their perceptions of research-teaching linkages and graduate attributes is under consideration as part of a summer conference in order to explore and examine what students want or aspire to achieve from their undergraduate experience.

Links between the Roberts-funded generic skills programme, aimed at postgraduate students and postdoctoral researchers, and academic professional development are providing training and development opportunities in learning and teaching for postgraduates (and postdoctoral staff) who teach, exploring the relationship between teaching and research within the University.

University of St Andrews - the undergraduate research internship programme

The undergraduate research internship programme (URIP) is intended to give undergraduate students experience of research during the summer vacation. It is designed to enhance the understanding of current research programmes for undergraduate students, giving practical experience and encouragement to consider a postgraduate career in research.

Applicants should be matriculated students of the University of St Andrews (though in exceptional circumstances, matriculated students of other universities may apply). Typically students will have completed the penultimate year of their degree programme, though it is possible for students to apply earlier in their undergraduate careers. Students who have completed their undergraduate studies cannot apply.

While it might form part of a larger programme of work, the research will be an independent, self-contained study that has its own specified aims and objectives. Any type of research activity that would normally be conducted in the University can be considered for support. All research conducted is subject to relevant legislation and regulations (concerning for example, ethical approval, health and safety, fieldwork risk assessment and University policy concerning academic misconduct). URIP funding must not be used to support research that will form part of a credit-bearing programme.

While the experience should benefit a student's studies, the actual work done is explicitly not part of an undergraduate degree programme. The St Andrews University URIP will provide a stipend benchmarked against that provided by The Wellcome Trust - currently £180 per week for a maximum of 10 weeks. If further support is required it must be found from other sources; no extensions to the support given will be provided. This is exclusively for the student and does not cover any necessary research expenses, which must be provided by the supervisor. In 2008, the University will make up to 20 internships available.

4.7 Organisational direction

University of Abertay Dundee - the White Space project

The White Space project was initiated in autumn 2005 as a change management project at the University of Abertay Dundee, designed to have a significant impact across the whole University. The aim of the project was to build upon a range of activities that were going on at the University, and for which the University was being recognised externally, such as the Dare to be Digital competition - an interdisciplinary research-focused competition around environmental sciences and the University's graduate business incubator (Embreonix) - and to remodel the whole University around some of the skills developing in these areas. In particular the project was designed to heighten awareness of teaching and learning and to put Abertay students at the centre of the development of the University.

Out of the White Space project have come a new teaching and learning plan, a revised estates strategy, ideas for the development of a learning hub, and implementation of systems for involving students in internal processes. It was also crucial that the University developed a very visible physical space within the campus where White Space activities could be seen to be going on.

White Space is designed to facilitate casual and non-casual interaction and to promote ideas associated with team working and the development of networks both for students and for all other users of the facility. The external partners who use White Space are keen to find ways of interacting with the University's students. The White Space studentships are designed to ensure real creative thinking across a wide range of disciplines - from animation to robot cultures and from interactive cityscapes to visualisation of complex datasets. The teaching space is organised so that it can promote team working in small groups and the linkage of Embreonix into White Space means that undergraduate students can see how their ideas might be developed into businesses.

Glasgow School of Art - studio approach

Glasgow School of Art (GSA) considers that the curriculum is the situation where research, teaching and scholarship are most likely to coincide in the student experience. A core method for delivering the curriculum at GSA is the studio project. Thus consideration of the studio project, its pedagogy, assessment and learning outcomes, illuminates further GSA's understanding of the research-teaching nexus.

A distinguishing characteristic of learning and teaching at GSA is the pedagogy of the studio. Contemporary studio pedagogy is enquiry-led and student-centred, integrating the acquisition of research habits, tools and techniques. The studio project is the

principal means through which this particular pedagogy is facilitated, with teaching episodes evident in the form of lectures, seminars, tutorials, demonstrations and external visits. The activities of the studio project involve an iterative and creative process of problem-solving that includes gathering of contextual, conceptual and material-based information. From this baseline of data, questions are formed, problems are articulated and issues identified as part of the development of the individual's knowledge. The interrogation of questions, problems and issues leads the student to propose 2D/3D possibilities explored in drawings, models and maquettes.

In the earlier stages of the undergraduate programme, studio projects are frequently time-limited, encouraging the rapid turnover, development and resolution of ideas ahead of the studio-based critical review which forms part of the assessment process. As such, at this stage the resolution presented for assessment is rarely a definitive end to a project, and is as likely to be the starting point for a future enquiry and to represent the development of research skills to a certain point which will be revisited at a later date, possibly as part of an entirely different project.

Art school pedagogical strategies are modelled on the real-world behaviours of professional practice and research in the creative arts. In other words, students **enact** their learning in a manner highly similar to the everyday professional practice of their teachers and other professionals in their disciplines, and learn to acquire and develop knowledge **directly**, through experience rather than through the second-hand transfer of knowledge from academic staff. Performance of knowledge is a key concept in the pedagogy of the art school studio and brings together the subject-based knowledge of creative practice with the pedagogical knowledge of teaching.

University of Strathclyde - investing in excellence

The University of Strathclyde's new strategic plan, *Investing in Excellence* (2007-2011), states that the University takes great pride in the direct link between high quality research and excellent education and will ensure that this link permeates the University's programmes at all levels. Further, the strategic plan aims to ensure that all teaching activities are informed by disciplinary and pedagogic research. An outcome of the initial awareness-raising undertaken for the Research-Teaching Linkages Enhancement Theme has been that there is significant empathy with this Enhancement Theme at many levels - provided the wider interpretation of research described in an earlier part of this report is adopted.

An additional outcome has been that there are numerous examples of good thoughtful practice in linking research and teaching throughout the institution. Some have been consciously built into the curriculum with a prior knowledge of the issues surrounding the research-teaching nexus and related graduate attributes, others have been developed subconsciously in the belief that the link is an appropriate thing to do within a university and is one factor which makes higher education distinctive.

What the University of Strathclyde has not yet developed, beyond a strategic desire, and implicit good practice in forming these linkages, are the approaches and processes which will allow this to become explicit and permeate all degree programmes and decision-making procedures. However, there is a desire to formally enable this, and in this sense, the timing of this Enhancement Theme has been fortuitous since it comes at a time when the University of Strathclyde has not only reformed its strategic plan and is at the start of a (no doubt lengthy) process of implementation, but also will move into a

period of curricular review. This gives the University the opportunity to explore in the coming months how it can address and make explicit the kind of attributes that it wants graduates to achieve and to acknowledge this in a more formal way. The University of Strathclyde is therefore taking the view that this Enhancement Theme has been the starting point for its formal institutional approach to the research-teaching nexus.

UHIMI - building capacity

The vast majority of undergraduate and taught postgraduate students are based in the UHIMI colleges, which have a heritage and continuing dominance of business in the provision of further education and Scottish vocational qualifications courses. Notable exceptions are the Scottish Association for Marine Science and the Highland Theological College, which provide honours provision in marine science and theology respectively, masters provision in the latter, and postgraduate research opportunities in both areas.

Across the larger colleges there is little research activity feeding into the curriculum, while at Scottish Association for Marine Science and the Highland Theological College, the small class sizes ensure that students become embedded in the culture of research from the earliest days of their arrival. Although research-teaching linkages are not explicitly pursued as such in the curriculum, the embedding of research skills development is intrinsic to the nature of the courses available.

UHIMI has recognised the need to enhance the breadth of honours provision across the institution, but in so doing have identified the need for staff development in the areas of research and scholarship. Against the predominant background of academic staff who are inexperienced in research and employed on teaching contracts demanding 20-plus contact hours per week, the magnitude of the task is large.

Royal Scottish Academy of Music and Drama - performance-based research and teaching

The notion underpinning the Royal Scottish Academy of Music and Drama's approach to both research and teaching is that it is performance that lies at the heart of creative and artistic success, and the development of graduate attributes. Students of both music and drama in the Academy develop professional expertise in preparation for careers in performance and production, both live and mediated. The two major suites of programmes have exceptional links with the professions, and a high usage of part-time practising professionals and artists incorporated within courses.

The diverse range of staff expertise, and strong relationships with the theatre, screen and music industries, ensure that training is contemporary and constantly informed by dialogue with the professions which the Academy serves. In this way students engage directly with the communities of practice they are seeking to enter and the traditions of professional practice employed by these communities.

Research in such contexts is defined principally in terms of encountering, exploring and modelling real-world professional practice, performance and creative production. Research-teaching linkages are established through the use of (often part-time) professional practitioners providing individual tuition. This is informed by state-of-the-art technique, and an informed and critical understanding of the cultural and intellectual contexts of such practice.

Through a restructuring of provision into two major schools, the Academy is now seeking to strengthen the integration of practice-based research and teaching in both of its major suites of programmes. All of RSAMD's programmes are firmly rooted in the practice of making performance, and students work on a range of fully realised projects and productions in real-world contexts. Often these will be collaborations with professional theatre, film and music companies, and will be performed in professional theatre and orchestral spaces. Drama students engage in active working relationships with the National Theatre of Scotland, the Royal Shakespeare Company, the Playwrights' Studio Scotland, Vanishing Point, the Traverse Theatre, the Tron Theatre, The Arches, the Tramway, and many other companies. Music students experience 90-minute individual lessons, for 30 weeks of the year, from practising professional musicians from Scotland's leading orchestras, ensembles and music groups.

4.8 Enhancement of graduate attributes

A major emphasis of the sector-wide project has been the ultimate objective of enhancing graduate attributes. This has taken place against a background of intense policy initiative. The Scottish Government has its own *Skills for Scotland* strategy¹⁰, while the Leitch Report¹¹ has linked the acquisition of knowledge skills with the economy: 'In the future, the prosperity of economies will increasingly depend on their skills bases. The workforce will have to retrain, upskill and change jobs more often.' This focus on the value of skills and knowledge to economies echoes the Lisbon Agenda¹² and the European Union's e-Skills agenda¹³. In a knowledge economy, employees must be able to:

- work comfortably in a multidisciplinary and borderless environment
- work with others to create and share new knowledge
- take responsibility for learning development
- make effective use of all information sources including technology-based resources.

Together, these skills can be thought of as a form of 'research-mindedness'¹⁴. When colleagues in Scottish HEIs were asked to consider what might constitute appropriate graduate attributes for undergraduate higher education in a twenty-first century globalised world, to prepare our graduates to be both effective employees but also responsible and informed members of society, the following emerged:

- advanced techniques
- critical understanding
- independence
- disciplinary currency
- learner responsibility
- provisionality (knowledge, situations)

¹⁰ Available at: www.scotland.gov.uk/Resource/Doc/197204/0052752.pdf

¹¹ Available at: www.hm-treasury.gov.uk/d/leitch_finalreport051206.pdf (see section 1.17)

¹² Available at: www.europarl.europa.eu/summits/lis1_en.htm#b

¹³ Available at: <http://europa.eu/rapid/pressReleasesAction.do?reference=IP/07/1286>

¹⁴ Presented at the QAA Enhancement Themes conference on Research-Teaching Linkages (8 November 2007). Available at: www.enhancementthemes.ac.uk/documents/ResearchTeaching/MikeSmith.pdf

- contingency (knowledge, situations)
- creativity
- problem formulation
- problem analysis and resolution
- evaluation
- critical values - ethical, social, cultural, environmental
- evidence-based solutions
- argumentation
- deriving meaning from complexity
- diverse modes of enquiry
- informed judgement
- wider professional conduct - contextual 'savviness', political astuteness.

And at master's level:

- constructing conceptual frameworks
- critical evaluation of current research and advanced scholarship
- originality in the application of knowledge
- reconciling complex issues
- forming sound judgments
- coping with incomplete data.

It was felt that though there were necessary and important foundation employability skills such as time management, clear communication, teamworking and self organisation, these were not however deemed to be distinctive to a higher education environment. The graduate attributes indicated previously were felt to be higher order attributes and to require a research-informed environment for their development, as provided by higher education institutions. These attributes have certain threshold-like characteristics in that they are not always immediately 'in view' or understood by students, they require an ontological shift or a shift in belief, they often require an element of unlearning of previous conceptual stances, and they open up new conceptual terrain. In brief, they are likely to be challenging, even troublesome, as befits a higher education (see Meyer and Land, 2006).

Graduate attributes for international employment

The Council for Industry and Higher Education (CIHE)¹⁵ in the UK has recently recommended a set of characteristics identified by the American Council on Education as what are likely to be the graduate attributes required by global corporations (Olsen, Green and Hill, 2005). These make an interesting counterpoint to the characteristics identified within the research-teaching linkages sector-wide study. These international characteristics are as follows.

¹⁵ CIHE Global Horizons for UK Universities, see: www.cihe-uk.com

International/intercultural competences

Knowledge

- Knowledge of world geography, conditions, issues and events.
- Awareness of the complexity and interdependence of world events and issues.
- Understanding of historical forces that have shaped the current world system.
- Knowledge of effective communication, including knowledge of a foreign language, intercultural communication concepts and international business etiquette.
- Understanding of the diversity found in the world in terms of values, beliefs, ideas and views.

Attitudes

- Openness to learning and a positive orientation to new opportunities, ideas and ways of thinking.
- Tolerance for ambiguity and unfamiliarity.
- Sensitivity and respect for personal and cultural differences.
- Empathy or the ability to take multiple perspectives.
- Self-awareness and self esteem about one's own identity and culture.

Skills

- Technical skills to enhance the ability of students to learn about the world (that is, research skills).
- Critical and comparative thinking skills, including the ability to think creatively and integrate knowledge.
- Communication skills including the ability to use another language effectively and interact with people from other cultures.
- Coping and resiliency skills in unfamiliar and challenging situations.

A number of the Scottish HEIs have been explicitly addressing the issue of graduate attributes in their planning and policy discussions and some examples follow.

University of Aberdeen - the notion of 'graduate competences'

The institutional report for the University of Aberdeen made the following observations:

While the notion of competencies, brought by the employment market, as something gained from the practical application of skills and attributes seems to be a useful perspective to bring to the design of undergraduate programmes, it does bring with it the spectre of yet another framework of boxes to tick that may not be in the spirit of 'higher' education.

However, it does draw our attention to the importance placed by employers on experience, especially in areas such as communication, teamwork and project management. In this sense and in the context of what research-teaching linkages can bring to both undergraduate and postgraduate programmes, it would be useful to consider what experiences students can gain from research-teaching linkages. Further, students themselves should be encouraged to reflect on their experiences and the opportunities afforded them while studying at a research-driven institution, and the benefit such reflection would bring to their employability.

To a certain extent this is already recognised in the design of the postgraduate (PGR) programmes and supported by their use of PDP. There does not appear to be any reason why these activities should be restricted to the PGR programme, if this is the kind of thing graduate employers are seeking, indeed undergraduates now have access to PDP opportunities with the introduction of the portfolio tool.

Practical experience and reflection on it should not be regarded as something that makes PGRs distinct from undergraduates and should be accepted that research-teaching linkages that go beyond research dissemination are appropriate for all levels of undergraduate learning and teaching rather than being reserved for postgraduates.

The University of Aberdeen careers service hosted a seminar in December 2007 for a variety of local employers where the keynote speaker was Carl Gilleard, CEO of the Association of Graduate Recruiters. The institutional contact attended this session in order to gain insight into the employer perspective and was able to take the opportunity to interview Carl Gilleard. The chief executive provided some useful insights, including his view that employers tend to think in terms of competencies such as the application of skills and attributes to problem solving. He saw PDP and project management as correlates of competencies. Project management was viewed as a skill which could be used for every aspect of life.

A further observation was that the first time many undergraduates fail anything is when they get turned down for a job. Regular failure and making mistakes are guaranteed, especially in today's world of constant change. It was emphasised that graduates need to know how to deal with crisis, failure and making mistakes, and how to recover from such experiences.

The University of Abertay Dundee - graduate attributes

As part of its strategic plan, the University of Abertay Dundee has developed a set of graduate attributes that are applicable across the whole campus. These attributes were developed in consultation with all four schools within the University, and each school is responsible for developing a strategy for ensuring that taught programmes meet those attributes through their respective teaching and learning committees, liaising with the vice-principal and quality office throughout that strategy development and implementation. The strategy implementation then feeds into the programme approval process for any taught programme of study.

The teaching and learning strategy combines these graduate attributes with a set of learning targets (see below) and in combination these serve to define a distinct shift in the University's practice. To support that shift, the quality office has developed and is continuing to enhance a framework for staff development, phased across different academic years.

The graduate attributes at the University of Abertay Dundee are as follows.

Confident thinkers, who demonstrate:

- 1 a comprehensive understanding of their primary field and its structure
- 2 an awareness of the stable, the new, the provisional, and of significant shifts in knowledge
- 3 an ability to identify the current boundaries of their subject field, a willingness to breach them, and the knowledge to work within the margins
- 4 a sense of knowledge texture, differentiating (in use) principles, exceptions, examples, elaborations, restatements, paradigms, models and other categories of knowledge
- 5 recognition of levels of confidence appropriate to differences in the status of knowledge and in personal understanding.

Determined creators, who are:

- 1 initiating and managing creative process
- 2 establishing and refining frameworks for evaluating creative process and progress
- 3 actively seeking opportunities to develop new knowledge
- 4 skilfully differentiating occasions for creativity from those for the exercise of bounded problem-solving and specialist expertise
- 5 valuing and seeking out collaboration within and across disciplines
- 6 maintaining commitment, direction and pace in changing circumstance and creative fortune.

Flexible collaborators, capable of:

- 1 defining and developing individual roles in teams of various formation and purpose
- 2 recognising and supporting the individual contributions and skills of others
- 3 interpreting and responding to changing group dynamics
- 4 adapting to specialist and generalist roles
- 5 understanding the interdependence of ideas and their development
- 6 recognising and valuing perspectives, methods and contributions across disciplines.

Challenging complexity, driving change by:

- 1 enquiring and reflecting
- 2 abstracting, refining, driving and synthesising
- 3 moving between modes - numeric, visual and textual - and information sources
- 4 working flexibly and effectively with ambiguity, uncertainty and error
- 5 recognising the opportunities and impacts of change, changeability, interconnectedness and complexity
- 6 creating opportunity and process for innovation.

Learners at all stages of study will engage in managed and supported reflection on their own development of skills underpinning the University's graduate attributes, and of a personal, provisional and continually developing understanding of subjects, their interrelation, and their contribution to individual, social and economic futures.

As an example of the University's approach, the programming smart software modules (discussed in Volume 2) run alongside a set of professional development modules that incorporate an academic tutor scheme. The graduate attributes not met by the programming smart software modules are met by the professional development modules. At year 1, professional development considers the value of inter-disciplinary teamwork, meeting the 'determined creators' point 5 (above) and 'flexible collaborators' point 6. Professional development also has a formal and substantial (double module) group project that covers fully all aspects of 'flexible collaborators', points 1-6.

Finally, professional development also encapsulates the honours project and this is where 'determined creators' point 6 and 'challenging complexity' points 4 and 6 are met. Student reflection on their own skill development, and awareness of their own development, is addressed by the academic tutor system in years 1 and 2, and by the group and honours project in years 3 and 4.

Graduates at all stages will be assessed on their achievement of the graduate attributes applied to their area of study and at a level appropriate to their stage of study. Module descriptors will feature any graduate attributes met explicitly and the assessment moderation process will review the way in which the module meets its discipline-specific learning outcomes and the general graduate attributes. The programme specification for programming smart software will ensure complete coverage of graduate attributes across the module set.

Learners on all programmes of study (undergraduate and postgraduate) will develop a confident understanding of the shape, the history and the contemporary dynamic of their discipline(s) of study, of its current concerns and prospects, and of the purposes and processes it applies to knowledge development, transfer and application.

There is a natural evolution in the programme of study provided by the programming smart systems modules. The modules move from programming within a single processor and interfacing with single and then multiple devices (years 1 and 2) to the complexities and advantages of working with multiple interconnected software systems and processors (years 3 and 4). The teaching at years 3 and 4 reflects the current trends in software system development and employs contemporary software and hardware development environments, and the taught content will be contextualised within the historical and future development of the computing continuum.

Scottish Agricultural College - graduate attributes

At the Scottish Agricultural College linkages between research and teaching increase with progression upwards from The Scottish Credit and Qualifications Framework (SCQF) level 7 and are particularly evident at SCQF levels 9 and 10 (BSc/BSc Hons).

For example, for BSc (Hons) Applied Bioscience/Applied Animal Science/Agricultural Science/Green Technology, the graduate will be able to:

- apply a sound critical and analytical approach to the issues affecting the business or organisation
- apply and further develop the latest practical and scientific techniques to solving problems faced by the business or organisation and to achieving their goals
- apply detailed and integrated current knowledge and understanding of relevant science and technology to planning and implementing the activities of the business or organisation
- continuously update personal knowledge of relevant science and technology and transfer knowledge within the business or organisation as appropriate
- actively participate in formulation of long-term strategy applying both detailed scientific and technical knowledge and a full appreciation of ethical, environmental, management and economic aspects
- demonstrate leadership in dealing with complex ethical, environmental and professional issues in accordance with current professional and/or ethical codes of practices
- recognise the national and global context within which the organisation or business operates and how it interacts with society.

Glasgow School of Art - mapping QAA graduate attributes to learning outcomes

A simple mapping exercise at Glasgow School of Art revealed how closely QAA graduate attributes are mirrored in level 10 (year 4) learning outcomes for the BA (Hons) Design. (See table 1.)

This exercise, it was felt, could be repeated with each undergraduate programme in order to identify strengths and gaps in GSA current curricular provision. This could also be a useful activity for future staff workshops and discussion.

QAA graduate attributes	BA (Hons) Design, level 10 (year 4) learning outcomes - students will have demonstrated/be able to demonstrate:
critical understanding	formulate independent critical judgement and reasoned responses to the critical judgement of others
informed by current developments in the subject	a consolidated understanding of professional practice and the context for personal work
an awareness of the provisional nature of knowledge, how knowledge is created, advanced and renewed, and the excitement of changing knowledge	
the ability to identify and analyse problems and issues, and to formulate, evaluate and apply evidence-based solutions and arguments	a knowledge and understanding of the specialist discipline at a high level, and the capability to relate this knowledge to personal practice
an ability to apply a systematic and critical assessment of complex problems and issues	an ability to work with complex design issues at a professional level and demonstrate a high level of creativity in producing design solutions
an ability to deploy techniques of analysis and enquiry	a detailed knowledge of appropriate research methods used in the acquisition, analysis and synthesis of source materials for practical application
familiarity with advanced techniques and skills	an ability to combine appropriate practical processes and exploration of materials to resolve an individually negotiated programme of study at a professional level
originality and creativity in formulating, evaluating and applying evidence-based solutions and arguments	an ability to work with complex design issues at a professional level and demonstrate a high level of creativity in producing design solutions
an understanding of the need for a high level of ethical, social, cultural, environmental and wider professional conduct	an awareness of ethical and professional issues related to your subject specialism practice in ways which show a clear awareness of own and others' roles and responsibilities
	communicate ideas through the use of verbal, visual and written materials at a professional level to informed audiences

Table 1: Mapping graduate attributes to level 10 (year 4) learning outcomes, BA (Hons) Design, Glasgow School of Art

University of the West of Scotland - personal development planning

The University of the West of Scotland has recently strengthened its commitment to the introduction of PDP in all University programmes in session 08/09. The concept of PDP and its relevance to improved learning, employability, graduateness and the acquisition of skills (including research skills) has received widespread recognition and the University continues to develop practice that projects a clear link between employability, graduateness and PDP. The University has recognised that the introduction of PDP will require additional student support and to this end University regulations have been revised to include this as 'support for students' learning skills and personal development'.

Extra curriculum hours have been made available at all levels in all programmes and schools are currently developing suitable activities to embed PDP into their programmes and into the extra hours. Many of these activities, in particular at SCQF levels 9 and 10, will be designed specifically to enhance and support students' achievement of research skills and attributes.

Glasgow Caledonian University - the Real WoRLD initiative

The Real WoRLD (Realising Work-Related Learning Diffusion) initiative¹⁶ is identifying key factors impacting on the employability of GCU graduates.

Factors include the development of key attributes, including those relevant to research-teaching linkages. Working in partnership with staff across schools, Real WoRLD is developing solutions for increasing the effectiveness of work-related learning and enhancing the employability of GCU graduates. Solutions will be devised, piloted, evaluated and rolled out across the institution over the next three years.

Glasgow School of Art - assessing graduate attributes through portfolio and critical review

When undergraduate students present completed work for summative assessment, among the possible instruments of assessment are the folio of work and the review. The folio of work comprises both finished artwork, and evidence of process(es).

The review is an open dialogue between students and tutors where multiple perspectives are brought together and critiqued. This is an exploration of the provisional nature of knowledge; in the face of different interpretations, assumptions and beliefs, students are encouraged to represent their work through verbal means and to accommodate abstract judgements. The critical review is a means of identifying, analysing and de-constructing the knowledge implicit in the visual work and seeking or offering validation through peer review.

As regards summative assessment, completed artworks, designs, prototypes, etc, are submitted for summative assessment alongside evidence of process(es). While professional judgements are made concerning the final work, careful consideration is also made regarding the integrity of the enquiry process preceding the development and/or execution of the artwork. The evidence of process is most often documented in a 'portfolio' which may comprise sketchbooks, notebooks, models, materials tests/samples etc. There may also be details of correspondence, planning applications, funding proposals and draft publications depending on the nature of the subject specialism. Within this portfolio an

¹⁶ See: www.academy.gcal.ac.uk/realworld

assessor would expect to recognise work that communicates the development and transformation of ideas, perhaps through several cycles of analysis and adaptation.

What the student hopes to demonstrate is that a valid process of identifiable iterative enquiry underpins the final work. The ability to 'read' such a process depends on the assessor's confidence and expertise with the aesthetic and visual language in addition to empathy for the intentionality of the work. This type of assessment documentation is valued across the creative arts and design higher education sector, and reflects the value that the Glasgow School of Art places on facilitating authentic research experiences for students.

University of Glasgow - embedding graduate attributes at a faculty level

The University of Glasgow is now linking PDP, employability and the first-year experience initiatives through the articulation of faculty graduate attributes. Through teaching committees and associate deans, learning and teaching documentation will be developed that can inform programme and curriculum design and departmental review, and enable assessments that encourage the development of a range of attributes underpinned with a research orientation.

University of Strathclyde - graduate attribute framework

The University of Strathclyde has chosen to develop a graduate attribute framework which is a key aspect of the University's employability strategy. The framework has been developed through consultation with all academic departments and is in the process of being operationalised. The framework builds upon the University's history of being 'the place of useful learning' and is closely aligned with existing strategic goals.

The implementation of the framework will involve detailed work with programme teams to identify how aspects of the curriculum (including specific learning tasks) develop particular attributes. This will be supported by the development of a 'tool kit' of examples for staff to use. In addition, work is under way with the University's students' association and other stakeholders to look at how aspects of the co-curriculum also help develop the attributes identified in the framework.

4.9 Disciplinary cultures

Open University in Scotland - threshold concepts and troublesome knowledge in distance education maths and history

In terms of the development of graduate attributes through research-teaching linkages the Open University (OU) presents a distinct set of challenges. Distance education is characterised by a separation of course design from support, tuition and facilitation (known in the OU as course presentation). While course material is written and extensively edited to a high quality by a team of academics, students' understanding of course content is facilitated at scale by part-time tutors who may be highly distributed geographically.

In fact, these tutors are in a unique position as they have first-hand knowledge of the course as experienced by the students, which may be rather different to the course as envisaged by the teams who designed them. Tutors also have responsibility for supporting the process of learning, which is sometimes developed as an integral part of course content through the design of assessment, but at other times must reflect individual

needs, or sometimes universal needs, which were not envisaged during course design, such as the development of graduate attributes and the linkage of research and teaching.

The OU in Scotland is therefore piloting a methodology for describing course presentation through the eyes of established tutors who teach multiple presentations of the same course with different cohorts. This systematic study of course presentation will then be shared in seminars with those who design the courses. It is hoped thereby to raise awareness of parts of a course where students particularly need support, and where there might be scope for enhancing course design through constructivist activity, and, as part of this process, identifying opportunities for the linkage of research and teaching and the fostering of graduate attributes.

In the manner discussed by Cousin (2007), to which reference was made in section 2.2, the project team has drawn on threshold concepts and troublesome knowledge (Meyer and Land, 2005; Perkins, 1999) to stimulate and inspire tutors to reflect on the teaching of their course in a structured way. Having done so, there is then a logical next step for tutors to consider constructivist approaches to helping students with the difficulties which have been identified.

In two initial face-to-face workshops, tutors from first level maths and second level history were introduced to threshold concepts and troublesome knowledge, and then asked to reflect on their own courses and look for resonances. They identified difficulties commonly encountered by their students and then shared activities and interventions which could help students with particular parts of the course. The workshop outcomes have been stored in two wikis, for the interest and contributions of other tutors and the course teams. Tutors are now required to access the wikis throughout the course in order to try out and modify their observations on difficulties and associated activities.

Two final seminars are planned for tutor representatives to meet their respective course teams to discuss matters of design, including research-teaching linkages and the development of graduate attributes in these two disciplinary areas.

4.10 Graduate attributes within the disciplines

In addition to the examples included in Volume 2 and elsewhere in this report, the other (discipline-based) projects from this Enhancement Theme¹⁷ illustrate an array of approaches to research-teaching linkages but also to particular discipline-related issues that can arise, and which institutions might need to take cognisance of in terms of potential drivers and barriers.

For example, within the cognate area of *Medicine, Dentistry and Veterinary Medicine*, Struthers et al (2008, p 22) report that:

...there appeared to be a fairly major divergence between the opinions of medicine on the one hand and dentistry and veterinary medicine on the other. For the former, the GMC's *Tomorrow's doctors* (2003) has helped to free space in the curriculum which can be used to engender a research ethos. This has not occurred in dentistry and veterinary medicine. Here it was felt that there was pressure on time in the curriculum and that the focus of the governing bodies was on clinical attributes and knowledge base, so their curricula were more biased

¹⁷ Available at: www.enhancementthemes.ac.uk/publications

towards teaching required for clinical competences. This difference may be more perceived than real.

Within *Life Sciences*, Gartland and Wood (2008, p 23) note that:

Most institutions recognised that it may no longer possible to always offer all students 'wet' laboratory research projects... An increasing number of projects with significant information technology based content, in areas such as Bioinformatics, were being undertaken. These were seen as a natural extension of wet lab projects, since an ability to use biological databases, modelling or 3-D structure tools is likely to be required of almost all practising life sciences graduates in the coming decades... The importance of research projects, of whatever type, in life sciences programmes is reflected in the 20-50 per cent of honours credits associated with them...

In *Arts, Humanities and Social Science* (Gunn et al 2008, p 70) a wider issue of articulation with general and public culture emerged:

To fully do justice to the research-teaching nexus in the arts, humanities and social sciences, it would be as well to explore how demand for and interaction with these subjects is continually generated by more general culture... Indeed, this relationship with public cultures may be the most unifying aspect of the arts, humanities and social sciences, especially in light of the debates concerning both the justification of their study and the influence they might or might not have on graduate attributes.

Some small interventions might return significant payback, while other developments might require greater commitment, as was reported in *Physical Sciences* (Bates et al 2008, p 70):

In spite of very real pressures of time, space and finance, many interventions have been developed and introduced in the early years of the curriculum - despite this being when class sizes are typically largest, exacerbating such pressures... In some cases, these changes have been effected by relatively minor alterations that have been shown to have a big impact, such as rewriting laboratory guides in the form of a research paper (at an appropriate level) rather than as a recipe or set of instructions to be followed without the need for much independent thought. In others they have involved a larger scale redevelopment and often upgrading of infrastructure...

We need to bear four points in mind. First, the Steering Committee deliberately adopted a wide-ranging, inclusive definition of research-teaching linkages. The institutional reports suggest that institutional mission influences the prevailing interpretations of research-teaching linkages, although that generalisation is complicated by the differing paradigmatic dispositions of disciplines, as amply evidenced by the reports from the discipline-based surveys. It is impossible to tell from the data whether intra-institutional variation in interpretation and practice is greater or lesser than broad inter-institutional differences. It is likely both co-exist. As Trowler and Wareham (2007b, p 9) observe:

There will be congruence between some understandings of research and some understandings of teaching, while at the same time there will be antipathy between other sets of understandings. These are ideologically-founded sets of compatibilities and incompatibilities. Some combinations are amenable to enhancement in terms of the nexus while others are much less so.

Second, the emphasis in the Enhancement Theme on the connection to graduate attributes may have influenced the information which was reported. Put simply, knowledge sharing or transfer, that is the dissemination of new research findings in undergraduate teaching, is probably under-represented in the report. The information suggests it happens at various stages in the undergraduate curriculum with an implication that typically it is most common at honours level. There is an obvious case for expecting that dimension to be the most widespread aspect of research-teaching linkages, but that is not the picture that emerges from the institutional reports.

Third, many of the examples of activities at the discipline level appear to be individually driven, with only a minority, albeit of variable size depending on specific institution and discipline, demonstrating more systemic curricular developments and practices. Many institutions reported that they were, through various measures described above, taking steps to encourage broad curricular integration of research-teaching linkages.

Finally it is often argued that programmes which are subject to accreditation by professional bodies can be constrained in terms of the degree of flexibility afforded to them to make independent decisions about curricula. Nonetheless, many of those professional bodies do have clear, and often detailed, expectations about graduate attributes. Moreover, at least one institution commented that it is encouraging such disciplines to argue persuasively for the attributes which the academic staff believe to be appropriate. In a sense that stance could usefully align the findings of Barrie (2004) that attribute development is most likely to succeed when staff in the discipline support and take ownership of the initiative with institutional desires to meaningfully connect practice within disciplines with key strategic goals, values and objectives.

5 Challenges

A range of factors were encountered in the duration of the project which gave rise to productive discussions with colleagues in the institutions and which had a bearing on eventual findings.

5.1 Diversity of interpretation of research

It was recognised from its inception that there would be wide variations throughout the Scottish higher education sector in the extent to which institutions might engage with this Enhancement Theme. The nature of the linkage between teaching and research is complex and contested. Institutions started from different strategic positions and had different objectives. Hence within the sector-wide project we had an overall strategic intention but a very diversified outcome. In seeking to determine in which ways distinct disciplinary contexts might enable the attainment of collective graduate attributes, we adopted a broader definition of research than is currently common as a way forward to benefit the learning of students in institutions with a range of different missions. The variability that emerged across institutions in defining research, and which was included within the project, included the following:

- RAE returnable research
- practice-led research
- consultancy-based research
- research of local economic significance
- contributions to the work of associated research institutes or other universities
- various types of practice-based and applied research, including:
 - performances
 - creative works
 - industrial or professional secondments
- 'research-minded' activity, including in inquiry-based learning (IBL) and problem-based learning (PBL).

This variability often runs counter to conventional notions of research practice. For example, the creative visual disciplines of art and design and architecture present unique challenges and opportunities to institutions seeking to strengthen the links between research and teaching. Creative visual education as practised in art colleges has never been 'just absorption of a body of knowledge'. Students in the studio have always been active participants, acquiring both high-level knowledge (aesthetic judgment, taste, colour sense) and a variety of tangible hand, craft and technical skills. The majority of studio teaching is project-based and informed by primary research so, in some respects, the 'atelier' environment of creative visual education is a pedagogic model not unlike the science/engineering research lab.

In the visual arts there is a closer relationship between student work and staff output than in other areas. Indeed, the case can be made that staff and student are co-investigators by

way of being engaged in parallel enterprises. However, staff/student contact hours in studio teaching are high and this form of traditional contact can actually encourage dependency. The sector-wide move to outline 'student effort' hours helps in this regard by clearly defining the time students are asked to engage in independent learning.

5.2 Understanding the role research plays in learning and teaching

This broad range of understanding about the role research can play in learning and teaching was encountered across all sectors of institutions, from probationary through to senior staff, and both across and within disciplines. Some staff seemed to envision research activities as a quite distinct activity from undergraduate learning and teaching activities, as something that only occurs at the knowledge frontier of a discipline and so is only reported to undergraduates. There are also staff who do not explicitly recognise that the activities around research, such as project planning, preparing funding applications, dissemination of results and peer review, constitute part of the research nexus that could form an accessible and valuable part of the undergraduate learning experience.

Many activities in which researchers engage are a mirror of good learning activities and practice. Staff involved in research are well placed to formulate learning opportunities for undergraduate students that mirror their own professional research activities and simultaneously address concerns about the first year experience and ultimate employability of graduates. However, this would depend on a culture shift away from a narrow definition of the meaning of research. In several institutions, throughout the process of engaging with academic staff about research-teaching linkages, a consistent pattern of difficulty revolved around the meaning of research and in turn how it can play a role in teaching.

5.3 The 'oxygen' issue - staff attitudes to graduate attributes

A fairly common perspective on the notion of research-teaching linkages was that such linkages had always existed within research-intensive environments and were so established and taken for granted that they had become transparent and tacit. As one respondent commented, 'We assume they are around us, everywhere, just like oxygen'. This gave rise to interesting internal discussions within institutions. It was generally considered that the traditional synergy between research and teaching should not be the basis for complacency. It is all too easy for staff to reply to suggestions that research-teaching links need to be examined and strengthened with the response: 'But we do it already.' As the report from one well-established research-led institution indicated:

The responses from [university] schools in relation to graduate attributes acquired by students in a research-intensive environment emphasise intellectual and scholarly virtues rather than transferable skills. This is very heartening, but we must recognise some problems in dealing with graduate attributes. We assume that, when students come to this University, they have the capacity to develop the graduate attributes we want them to possess. But how do we (or indeed any university) approach these? Do we work on the basis that the attributes we expect students to have will be emergent properties of the teaching and learning experience as a whole - and if so, how can we be sure that our students do actually have these attributes when they graduate? Or do we specify how each

element of our teaching supports the development of these attributes, in a way that is closely defined and amenable to objective review? Do we align our ideas about graduate attributes with, for example, assessment strategies?

5.4 The 'silo' problem

A structural problem reported in a number of the institutions was an unhelpful separation or compartmentalisation of teaching and research through contracts, professional activities and other structural mechanisms. In these instances the university replicated most of these structural divisions within its committees and professional roles, which created challenges for bringing research and teaching/learning together. In many institutions there exist distinct teaching and learning committees, equivalent research bodies, and at senior management level (and also within departments) professional roles whose responsibilities invariably fall on one side or another of a structural divide between these two major dimensions of academic life.

There are pressures which tend in the direction of yet further specialisation between teaching and research, for example, the 'protection' of leading researchers from teaching pressures. As one institutional report pointed out:

Like all other universities, the University requires to engage with the values of external bodies, including the research councils, which have not so far engaged (in the manner, say, of the National Science Foundation in the United States) with spill-over value for undergraduates from research projects, ie for undergraduates conceived as part of the community of end users. The initial REF consultation document has contained little sign of change to RAE values which excluded undergraduate benefits from research as a criterion for evaluation.

Enhancement of this existing situation can come about in a number of ways. There is clearly a need to make activities more explicit. This can be done by the clear articulation of the learning outcomes of individual course modules, of programme levels and of entire programmes. Increasingly there is a need to be more holistic in defining these aims.

5.5 Rewarding levels of engagement by staff

There is a need for reward and recognition structures that value research-teaching linkages as providing a process-based environment of learning, rather than just privileging research productivity. This would mean taking seriously curriculum redesigns that offer simulations of research-type experiences without necessarily being able to offer an authentic research outcome in terms of publication. Ideally, this needs to be reflected more directly in the promotions criteria of institutions.

The institutional context in a number of the Scottish HEIs presents challenges associated with change management; in particular changes that challenge notions of academic identity and role. There will be related challenges in terms of definitions of research and scholarship, perceptions of status, and staff career policy.

This context also presents opportunities to explore the concept of subject-scholarship, raising the profile and practice, and focusing on application and impact on student learning and graduate attainment. This will include a need to define excellence in

subject-scholarship. If a basic level of subject-scholarship is an expectation of all teachers, how might we define, encourage, recognise and reward outstanding performance?

5.6 Recognising the accumulative progression of attribute development from level 7 to level 10 (years 1 to 4)

Within all of the endeavours there is a real need to recognise the potential to emphasise and value different attributes at different times, depending on student and subject learning needs. This can seem insurmountable within a highly modularised system, yet it is clear that academic staff have a sense of what is possible in level 7 and 8 and also what is necessary in levels 7 and 8 to enable progression into honours. This perhaps suggests the need for faculty-based agreement on core and discipline skills and attributes as part of programme specifications and faculty quality assurance processes.

To make such agreements robust, evaluations would need to explore this cumulative effect, as well as being focused on one or two projects within any given student's undergraduate programme.

5.7 Dilemmas of leadership

One institutional report referred to the need to watch for unintended consequences of 'gate-keeping' by heads of department, or other postholders, in relation to discussion of curriculum developments that were perceived by some (but not all) academics as dislocated from their research. If there is a potential issue it could occur in a range of institutions. One manifestation might be daily communicative activities amongst heads of department focusing on the apparent urgency of imperatives (such as PDP and employability) and the deduction that they need to 'protect' research active staff in the face of a push to implement 'new things'. This presents dilemmas of leadership in terms of addressing priorities and balancing allegiances both to senior management and to departmental colleagues.

What is clear is that a substantial number of academics are already engaged in many of the imperatives. What would be useful would be to ensure that heads of department continue to pass on to their colleagues relevant opportunities to develop, experiment and innovate, as well as embedding approaches into curriculum design where possible.

5.8 Imperative fatigue

Though not particularly prevalent, there is some feeling that there are too many 'imperatives' to manage and that (at least a perception of) unmanageable urgency surrounding them is a problem. It seems there is a need to begin a more systematic joining up of the various curriculum developments at the same time as a stronger, more explicit recognition that where adaptations and revisions of the curriculum are occurring, timescales need to reflect the realities of in-depth evaluation.

5.9 Evaluation and assessment

What emerged from certain reports was the impression that those institutions might be well placed to roll out a strategy for enhancing student experience and engagement with the research culture at all undergraduate levels. What would be of real value, however, is the time and resources to evaluate the impact of such activities in the light of the broad range of other intersecting factors that influence graduate attribute development.

There also remains the substantial issue of how research-teaching linkages and graduate attributes can be effectively assessed within the curriculum and where responsibility most appropriately lies for this. There is currently much ongoing work into the potential use of PDP approaches in this regard. This issue is a major priority for many of the SFC-funded employability initiatives currently under way in Scottish HEIs, as well as PDP projects supported by Roberts funding. It would be helpful to establish connections with work currently being undertaken in Scotland regarding the Bologna requirement for diploma supplements. There is also an obvious profitable link to be pursued with the Assessment Enhancement Theme.

5.10 Resourcing

There are resource implications associated with many of these issues and challenges. It is recognised that to further enhance research-teaching linkages requires a clear institutional policy and staff willingness to make the necessary changes. The latter is central to any attempts to increase linkages between teaching and research and the main resource implication is likely to arise in the funding of appropriate staff development activity.

5.11 Staff development

As the foundation of research-teaching linkages is the approach to teaching, learning and assessment, staff need to be encouraged to look again at the modes of teaching and assessment in modules. At workshops and seminars carried out in Scottish HEIs during the project, the following suggestions emerged as potentially effective ways of providing appropriate staff development:

- encouraging staff to attend relevant discipline-based conferences on pedagogy
- implementing a 'shadowing process', where staff in different departments might shadow one another and observe different research-teaching linkages
- encouraging research staff to suggest appropriate material for inclusion in courses and modules
- encouraging staff participation in knowledge transfer events
- encouraging staff participation in cross-institution interest groups and discussions
- establishing links with HEA Subject Centres to organise local events on research-teaching linkages.

5.12 Research capacity building

In some of the newer Scottish HEIs, or in certain professional domains such as education or health where a sizeable proportion of academic staff have not undertaken significant postgraduate research activity, the raising of staff qualifications and experience is a major challenge. Further, with contractual obligations to 20-plus hours student contact per week, there are major barriers to enhancing the research and scholarship activity of academic staff.

While these issues are being tackled at the highest levels in many of the institutions, there will probably be at the very least a significant time lag before any notable institutional transformation in the embedding of research-teaching linkages will be able to take hold in these particular instances. What should be possible in the shorter term, however, is a deepening of the institutional engagement with the outcomes of mission-critical enhancement themes. Research-teaching linkages are now being recognised as sitting in this category. Learning, teaching and assessment strategies, and annual programme monitoring processes can provide useful foundations upon which to strengthen the learner experience in this respect.

6 Conclusions and recommendations

- The Enhancement Theme has both established and contributed to valuable dialogues.
- Clear links between research and teaching are well established in the later years of undergraduate programmes. This project, along with the other discipline-based projects, has also found an extensive raft of examples of similar links in classes which occur in the early years of the undergraduate curriculum.
- Not only does the phrase 'graduate attributes' resonate fairly comfortably with the values of the academic community, but there is growing evidence of institutions, or parts thereof, defining the attributes which they expect their graduates to possess. In many professional programmes there are varying degrees of professional body prescription of key attributes required for registration or programme validation/accreditation.
- The sector-wide information generated is both encouraging and distinctive in the sense that much of the previous work on research-teaching linkages has been focused primarily at the localised level. Thus the Enhancement Theme has produced a distinct contribution to existing knowledge which should be of interest both to Scottish HEIs and to universities and researchers based in other countries.
- The conversations on research-teaching linkages have been rich and diverse, and that diversity should be celebrated. Institutions, in seeking to advance dialogues and consider what further steps might be worthwhile and appropriate in relation to policies, structures, resources and practices, might find it helpful to reflect on the utility of the typology of 'dimensions of readiness' offered in Section 4 of this report. These being: procedural/structural; contractual/reward mechanisms; new policies/strategies; engagement; organisational direction; graduate attributes; and disciplinary cultures.
- Consideration should be given to ways of encouraging localised actions to promote effective research-teaching linkages while securing productive alignment with institutional discussions of, and policies on, graduate attributes.
- Attention also needs to be paid to the levers which might be used to foster effective research-teaching linkages, including organisational practices (such as programme reviews and specification templates) and suitable supportive educational and staff development initiatives.
- The momentum of the Enhancement Theme and related work at institutional, discipline and sectoral levels should be maintained and nurtured. This might be achieved through future Quality Enhancement Framework initiatives, either by an extension of the current Enhancement Theme, or through an explicit strand in a future synoptic theme. There has been discernible enthusiasm for, and engagement with, this Enhancement Theme, but there is scope for further engagement and for progressing dialogues, reflections, evaluations and

consequential adjustments to policies and practices, structures and mechanisms. As part of that ongoing commitment the sector should continue to stay alert to, and connect with, similar initiatives and debates in other parts of the world.

- There were indications from a number of institutional reports that academic staff believed that students often lacked an understanding of the processes of linking research and teaching and how these correlate to and foster the key attributes and skills which employers seek and expect. This probably merits further testing through interviews with staff and students. However, that should not delay action within institutions directed towards assisting students to understand and value the intended relationships. Central components of such strategies will involve greater explicitness in regard to the role of research-teaching linkages in the curriculum and coherent communication both of overall objectives and of the role of specific learning processes and intended outcomes. It is recommended that institutions strengthen policies and practices directed at the latter.
- The topic of research-teaching linkages is attracting attention in several countries. It is recommended that a focused booklet is produced which distils some of the key dimensions and findings from international studies.

7 The road ahead

Institutional reports from the sector-wide project confirm that much valuable work is now under way in terms of identifying and adopting effective practice within research-teaching linkages, and promoting the graduate attributes that arise from such activity. A number of issues remain to be addressed as the Enhancement Theme takes hold and is implemented more widely.

7.1 Evaluating progress

A question remains at this stage as to how we know if research-teaching linkages in institutions are being successful at module or programme level, or if they are developing research-type graduate attributes. Thus there is a need to identify any approaches that would help determine whether research-teaching linkages are effective. We need also to consider how we would set about monitoring such measures of effectiveness.

Organisational approaches will need to focus on finding ways of integrating and linking different imperatives across large institutions, as well as finding ways of communicating cross-campus practices in ways that engage staff who are not already involved.

In these processes academic development units will have a role to play (and will need sufficient time) in evaluating the impact of both specific examples and the general culture as part of the students' disciplinary, research, personal and professional development. They could also usefully investigate how well articulated with the development of graduate attributes are our current practices and policies in assessment and recording achievement (including PDP).

7.2 Academic staff approaches

Academic staff approaches will need to focus on the development of creative ways of authentically aligning the research priorities of the disciplines with the needs of undergraduate learning. Authenticity is important because of the need (expressed and believed by the academics interviewed so far) to acknowledge the importance of maintaining the integrity of what students experience. This means recognising and valuing the nuances between curriculum developments that are primarily pedagogical in nature and those which genuinely explicate research-oriented attribute acquisition. These are not necessarily separable approaches but the priorities in the former might not always be the same as those in the latter.

There is a need to provide appropriate institutional framing which enables coherence while encouraging high levels of local flexibility and ownership. The development of graduate attribute frameworks is an explicit attempt to achieve that alignment. The discipline-based projects provide illustrations of action within communities of practice.

7.3 Links with the First-Year Experience Enhancement Theme: raising the status of first-year teaching

As the outcomes from the Research-Teaching Linkages Enhancement Theme accumulate, it is becoming apparent that the gains sought in relation to the First-Year Experience Enhancement Theme could in part be addressed by wider adoption of some more explicit research-teaching linkages. This needs to be explored further as the outcomes and dissemination of the Research-Teaching Linkages Enhancement Theme continues. Possibilities could be explored between groups responsible for the First-Year Experience, Research-Teaching Linkages and PDP to maximise the gains available.

Synergies between the Research-Teaching Linkages and the First-Year Experience Enhancement Themes have already been identified in terms of attempting to achieve:

- an emphasis on success
- engagement (not just retention)
- empowerment
- 'personalisation'
- the strong influence of peers
- students as co-creators of their own learning experience
- a desire to be challenged
- ways of overcoming isolation and boredom factors
- promotion of research skills for later professional roles
- a higher status for first year teaching
- making large classes feel smaller.

7.4 A progressive continuum: fostering 'research-mindedness' early

Within all of these endeavours there is a real need to recognise the potential to emphasise and value different attributes at different times depending on student and subject learning needs. This can seem insurmountable within a highly modularised system, yet it is clear that academic staff have a sense of what is possible in level 7 (year 1) and level 10 (year 4) programmes and also what is necessary in levels 7 and 8 to enable progression into honours. The *Physical Sciences* Enhancement Theme report argued that:

A departmental or institutional approach would ensure that the self-nucleating islands of activity and innovation that naturally appear do not remain isolated but thrive as part of a coherent strategy. We are often concerned with examining programmes and activities horizontally (across a course, module or year of study) but it is harder to look vertically for themes that develop and progress through programmes.

The emphasis from the Steering Committee of the Research-Teaching Linkages Enhancement Theme has always been that engaging students from the outset in research-type activities (such as enquiry-based approaches to learning, critiquing research papers, generating research information, debating issues) gives first-year

students more responsibility for, and control over, their own learning outcomes. It is also likely to improve their transition experience, be it from schools or from other educational backgrounds. At a time when students are increasingly spending less time on campus it may also go some way in connecting them more closely to their learning environment. It may also facilitate a more intensive approach to individual feedback and allow students to become increasingly involved in the creation of content and encourage self-directed learning.

7.5 Heeding the student voice

The work undertaken by both the sector-wide project and the discipline-based projects suggests that students frequently do not fully understand how research-teaching linkages can help foster important graduate attributes. The identity and benefit of linkages can remain tacit within curricula and need to be 'surfaced' and recognised by students so that they can better articulate the nature of their own achievements and development at later stages in their careers. Scottish HEIs' student associations would be useful and willing allies in such an endeavour, and a number of institutions consulted with sabbatical officers and other student representatives as part of their deliberations in support of this Enhancement Theme. The next step may be to give thought to how that range of involvement could be effectively widened and deepened.

7.6 Forging alliances with other initiatives and maintaining momentum

Graduate attributes were a major focus of the Enhancement Theme. Many Scottish HEIs have specific policies and initiatives aimed at addressing the development of key graduate attributes. Many institutions have been working on such issues for some time, with recent catalysts including the Employability Enhancement Theme and SFC financial support for a post in each Scottish HEI dedicated to employability co-ordination activities. This latter SFC initiative provides a timely opportunity and valuable resource in each Scottish HEI to take forward the work of identifying, assessing and recording achievement of graduate attributes that have been developed through research-teaching linkages. This is a potentially productive partnership that should be strongly encouraged.

As stated within the report it will be important to maintain the momentum of this Enhancement Theme and nurture the interest it has generated on a continuing basis. Future Quality Enhancement Framework initiatives offer possible opportunities in this regard, through extending the work of the current Enhancement Theme or by integrating dimensions of it into an explicit strand of a future synoptic theme.

8 Endnote

As is widely recognised, this is both a challenging and an exciting time for higher education. The nature of higher education, as well as its demographics, is changing amid an environment of increasing complexity, uncertainty, speed and risk. And of course students themselves are changing. The current generation arrive in our institutions with considerably different mindsets from their predecessors. The secondary schools sector in Scotland has already signalled its early engagement with preparing students to achieve their aspirations in an increasingly internationalised and unpredictable world. The four dimensions of Learning Teaching Scotland's *Curriculum for Excellence* are designed 'to create a curriculum that will enable all young people to become confident individuals, successful learners, effective contributors and responsible citizens' (Learning Teaching Scotland, 2007, p 1).

Higher education can build on this foundation. As in earlier periods of university learning, our varied missions as higher education providers retain a commonly-agreed purpose to help prepare our students as best we can, not only to cope with the challenges of the professional and cultural worlds that they will encounter, but to succeed and thrive in them, as employees and as responsible members of society.

9 References

- Alvesson, M (2002) *Understanding Organisational Culture*, New York: Sage
- Barnett, R and Coate, K (2005) *Engaging the Curriculum in Higher Education*, Maidenhead: SRHE/Open University Press
- Barrie, S (2004) *Higher Education Research and Development*, Vol 23, no 3
- Bates, S, Aliotta, M, Sinclair, B and Kohnle, A (2008) *Research Teaching Linkages: Enhancing Graduate Attributes: Physical Sciences*, Gloucester: QAA, available at: www.enhancementthemes.ac.uk/themes/ResearchTeaching
- Becher, T (1989) *Academic Tribes and Territories: intellectual enquiry and the cultures of disciplines*, Buckingham: Open University Press/SRHE
- Becher, T and Trowler, P (2001) *Academic Tribes and Territories: intellectual enquiry and the cultures of disciplines* (2nd edition), Buckingham: Open University Press/SRHE
- Boyer, E (1990) *Scholarship Reconsidered: priorities of the professoriat*, Carnegie Foundation for the Advancement of Teaching
- Boyer, E (1998) *Reinventing Undergraduate Education: A Blueprint for America's Research Universities*, New York: State University of New York, available at: www.sunysb.edu/boyerreport
- Brew, A (1999) Research and Teaching: Changing Relationships in a Changing Context, *Studies in Higher Education*, 24 (3), pp 291-301
- Brew, A (2003) Teaching and research: New relationships and their implications for inquiry based teaching and learning in higher education, *Higher Education Research and Development*, vol 22, pp 3-18
- Colbeck, CL (1998) Merging in a seamless blend, *The Journal of Higher Education*, 69 (6), pp 647-671
- Cousin, G (2007) *Exploring threshold concepts for linking teaching and research*, paper delivered at International Policies and Practices for Academic Enquiry: An International Colloquium, Marwell Conference Centre, Winchester, 19-21 April 2007
- Donald, J (1995) Disciplinary differences in knowledge validation, in Hativa, N and Marincovich, M (eds) (1995) *Disciplinary differences in teaching and learning: Implications for practice*, *New Directions for Teaching and Learning*, 64, San Francisco: Jossey-Bass Inc
- Gartland, K and Wood, E (2008) *Research Teaching Linkages; Enhancing Graduate Attributes: Life Sciences*, Gloucester: QAA
- Gibbons, M, Limoges, C, Nowotny, H, Schwartzman, S, Scott, P and Trow, M (1994) *The new production of knowledge: the dynamics of science and research in contemporary societies*, London: Sage

Griffiths, R (2004) Knowledge production and the research-teaching nexus: the case of the built environment disciplines, *Studies in Higher Education* 29 (6), pp 709-726

Gunn, V, Draper, S and McKendrick, M (2008) *Research Teaching Linkages; Enhancing Graduate Attributes: Arts, Humanities and Social Sciences*, Gloucester: QAA, available at: www.enhancementthemes.ac.uk/themes/ResearchTeaching

Hativa, N and Goodyear, P (2002) *Teacher Thinking, Beliefs and Knowledge in Higher Education*, Dordrecht: Kluwer

Healey, M (2005) Linking research and teaching exploring disciplinary spaces and the role of inquiry-based learning, in Barnett, R (ed) (2005) *Reshaping the University: New Relationships between Research, Scholarship and Teaching*, pp 30-42, Maidenhead: McGraw-Hill/Open University Press

HEFCE (2000) *Interactions between Research, Teaching and Other Academic Activities: Report to the HEFCE as part of the Fundamental Review of Research Policy and Funding*, Bristol: HEFCE

Higher Education Academy (2005) *Academy Exchange*, Issue 2, available at: www.heacademy.ac.uk/resources/publications/exchange

Jenkins, A (2004) *A Guide to the Research Evidence on Teaching-Research Relations*, York: Higher Education Academy

Jenkins, A (2008) *Research-Teaching Linkages: enhancing graduate attributes - Overview*, Gloucester: QAA, see www.enhancementthemes.ac.uk/themes/ResearchTeaching

Jenkins, A and Healey, M (2005) *Institutional strategies to link teaching and research*, York: The Higher Education Academy

Jenkins, A and Zetter, R (2003) *Linking Research and Teaching in Departments*, York: LTSN Generic Centre

Joint Future Thinking Taskforce on Universities (2008) *New Horizons: responding to the challenges of the 21st century*, Edinburgh: Scottish Government, available at: www.scotland.gov.uk/Topics/Education/UniversitiesColleges/16640/hetaskforce

Krause, KL (2007) *Knowledge Transfer, Engagement and Public Scholarship: Emerging Possibilities for an Integrated Approach to Academic Enquiry*, paper delivered at International Policies and Practices for Academic Enquiry: An International Colloquium, Marwell Conference Centre, Winchester, 19-21 April 2007

Krause, KL (2008) *The Teaching-Research Nexus; a guide for academics and policy makers in Higher Education*, project website available at: www.trnexus.edu.au/

Kuh, G (2008) *High Impact Activities - What They Are, Why They Work, Who Benefits*, paper delivered at 16th Improving Student Learning Symposium, Durham, England, 2 September 2008

Land, R, Meyer, JHF and Smith, J (2008) *Threshold Concepts within the Disciplines*, Rotterdam: Sense Publishers

Meyer, JHF and Land, R (eds) (2006) *Overcoming Barriers to Student Understanding: Threshold Concepts and Troublesome Knowledge*, London and New York: Routledge

- Neumann, R (1994) The teaching-research nexus: applying a framework to university students' learning experiences, *European Journal of Education*, 29 (3), pp 323-339
- Neumann, R, Parry, S and Becher, T (2002) Teaching and Learning in their Disciplinary Contexts, *Studies in Higher Education*, 27 (4), pp 405-417
- Olsen, CL, Green, MF and Hill, BA (2005) *Building a Strategic Framework for Comprehensive Internationalisation*, Washington DC: ACE
- Perkins, D (1999) The Many Faces of Constructivism, *Educational Leadership*, vol 57, no 3, November 1999
- Ramsden, P and Moses, I (1992) Associations between research and teaching in Australian higher education, *Higher Education*, 23, pp 273-295
- Robertson, J and Bond, C (2001) Experiences of the Relation between Teaching and Research: what do academics value? *Higher Education Research and Development*, 20, 1, pp 5-19
- Struthers, J, Laidlaw, A, Aiton, J, Humphris G and Guild, S (2008) *Research-Teaching Linkages: enhancing graduate attributes: Medicine, Dentistry and Veterinary Medicine*, Gloucester: QAA, available at:
www.enhancementthemes.ac.uk/themes/ResearchTeaching
- Trowler, P and Wareham, T (2007a) *Tribes, Territories, Research and Teaching: Enhancing the "Teaching-Research Nexus"*, Literature Review, available at:
www.lancs.ac.uk/fass/projects/nexus/docs/Deliverable_1___literature_review_30.4.7.doc
(last accessed November 2008)
- Trowler, P and Wareham, T (2007b) *Reconceptualising the Teaching-Research Nexus*, paper delivered at International Policies and Practices for Academic Enquiry, An International Colloquium, Marwell Conference Centre, Winchester, 19-21 April 2007

10 Appendices

10.1 Appendix 1: Research-teaching linkages framing tool

At institutional level:	For example:
Does the institution currently have any strategic plan that links research with teaching?	<ul style="list-style-type: none"> University of Sunderland: an integrated strategy Malaspina University-College: building design to link research and teaching
Does the institution employ any current framework or model for the development of graduate attributes? Which attributes are identified?	
Is Roberts funding currently being deployed to foster research-teaching linkages or graduate attributes? If so, in what ways?	
Do research-teaching linkages feature in key policies? (Are specific resources applied to these and if so by what criteria?)	
Does the institution have any programme to promote undergraduate research?	<ul style="list-style-type: none"> University of British Columbia: multidisciplinary undergraduate research program Massachusetts Institute of Technology: undergraduate research opportunities program McMaster University: Petro-Canada young innovator award
Is there any system of scholarships that might foster research-teaching linkages?	<ul style="list-style-type: none"> University of Warwick: undergraduate research scholarship scheme
Do institutional excellence in teaching and learning awards emphasise research-teaching linkages?	<ul style="list-style-type: none"> Auckland University of Technology University of Victoria, Wellington: awards for linkage
Have there been any recent 'strategic shifts' in the institutional 'game plan', for example organisational systems, committee structures, revised policies, that might prioritise research-teaching linkages or graduate attributes?	<ul style="list-style-type: none"> Southampton Solent University: advanced scholarship strategy

Are there any institution-wide policies on enquiry-based learning?	<ul style="list-style-type: none"> • Australian National University: introduction to enquiry • McMaster University: enquiry-based courses available across the curriculum • University of Calgary: student inquiry strategy
Have there been any specific events or awareness-raising initiatives to draw attention to research-teaching linkages?	<ul style="list-style-type: none"> • University of Alberta: institution-wide project, 'research makes sense to students'
Are there any specific scholarly awards that recognise the promotion of research-teaching linkages?	<ul style="list-style-type: none"> • Southern Illinois University: Paul Simon award • University of Toronto: Northrop Frye awards
What are the patterns of reward or recognition for engaging in research-teaching linkages?	<ul style="list-style-type: none"> • Promotion criteria • Professorial recognition
Has there been any redesign of module or semester structures which emphasises research-teaching linkages?	<ul style="list-style-type: none"> • Oxford Brookes University: building the linkage into the curriculum
Is there any use of performance indicators to foster research-teaching linkages?	<ul style="list-style-type: none"> • University of Sydney: strategic use of performance indicators to stimulate linkage
Is there any use of institutional targets to foster research-teaching linkages?	<ul style="list-style-type: none"> • Griffith University: identifying programmes including research-based learning component
Have there been any initiatives to benchmark research-teaching linkages development, either within or outwith the institution?	<ul style="list-style-type: none"> • Monash University and University of Sydney: teaching and research nexus benchmarking project
Are research and teaching linked in any way in accredited postgraduate courses on teaching and learning in higher education?	<ul style="list-style-type: none"> • University of East Anglia (UK): research-led teaching • University of Plymouth: teaching research • Durham University: use of threshold concepts

At faculty/departmental level:	For example:
How are institutional policy decisions linked with faculty policy formulation? Have these structures been used in the dissemination of research-teaching linkages?	
How would innovative work relating to research-teaching linkages be reported to the main university committees?	
What mechanisms are in place to monitor the development of research-teaching linkages at faculty/departmental level?	
Are strategies on employability and professional skills aligned with research-teaching linkages in any way?	
How are research-teaching linkages visible in strategic documents and implementation plans for the faculty or individual schools and departments?	<ul style="list-style-type: none"> • Teaching and learning strategies; performance reviews; promotion procedures; patterns of reward; recognition
In what ways has research into teaching been supported within the faculty in the last five years?	
How are research-teaching linkages monitored and evaluated within undergraduate and postgraduate teaching within the faculty?	
What methods of dissemination and what resources have been used to raise staff awareness of research-teaching linkages within the faculty/departments?	
Are teaching and learning courses integrated into doctoral programmes?	<ul style="list-style-type: none"> • Stanford University (USA): the I-Rite program • Madison University: center for the integration of research, teaching and learning • University of Oxford: centre for excellence in preparing for academic practice
What might be the incentives or disincentives for engaging in research-teaching linkages?	
Is personal development planning used in any way to foster research-teaching linkages?	

At course/curriculum development level:	For example:
Do current quality measures for the approval of curriculum design take into account research-teaching linkages or graduate attributes?	
Are there any systematic ways of modelling expert practice within modules and courses?	<ul style="list-style-type: none"> Through learning outcomes, aspects of the student experience, placements, particular learning methods such as enquiry-based learning
<p>Are there any curriculum policies on project-based learning or enquiry-based learning?</p> <p>Is there a developmental sequence or 'through line' for research-teaching linkages from first year to final year and postgraduate study? How is this monitored and evaluated?</p>	<ul style="list-style-type: none"> University of Roskilde, Denmark
How are course teams helped to develop and embed research-teaching linkages for a new programme?	<ul style="list-style-type: none"> Resources to develop new teaching approaches; materials preparation; staff development; use of pilots; provision of appropriate learning space
How are research-teaching linkages monitored and evaluated at course or module level?	
Are there informal opportunities for students to engage in research-teaching linkages outwith formal teaching?	<ul style="list-style-type: none"> Research seminars; acting as observers in research teams; student conferences; student journals

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10.2 Appendix 2: Research-teaching linkages audit tool

The following audit tool might be used to gain some understanding of the degree of readiness of an institution in terms of its awareness and capacity to embed research-teaching linkages within curricula. The seven dimensions of readiness in the table invite detail as to how the university's current strategic and operational position stands in relation to research-teaching linkages. It invites key development lines for further consideration in terms of institutional readiness, curriculum readiness, staff readiness and student readiness.

Dimensions of readiness	Current position and areas for development
Appropriate procedural/structural mechanisms	<ul style="list-style-type: none"> ● Revised proforma for faculty quality reports? ● Course/class approval procedures to seek information on research-teaching linkages through the proformas and/or approval mechanisms? ● Departmental review. Review guidelines to incorporate research-teaching linkages? ● Course annual monitoring processes?
Contractual/reward mechanisms	<ul style="list-style-type: none"> ● Do existing recognition and reward mechanisms support this? ● What can we do to encourage this?
Helpful existing or new policies/strategies	<ul style="list-style-type: none"> ● Strategic plan? ● Academic strategy? ● TLA strategy? ● Links with development of an employability strategy?
Ways of engaging staff and student interest and commitment around research-teaching linkages	<ul style="list-style-type: none"> ● Staff debates ● Educational fora/events ● Prizes/grants/awards ● Employability steering group? ● Faculty teaching and learning committees ● Use of local educational developers? ● Staff development programmes? ● Use of HEA subject contacts? ● Need to engage head of depts as key stakeholders ● How do we engage students? PDP? Students' association?

Organisational approaches	<ul style="list-style-type: none"> Any important strategic shifts going on, or changes in institutional direction of channel that might foster or accommodate research-teaching linkages New credit structures, institutional patterns of curriculum renewal? Changes to assessment strategy? Developments in first-year experience (FYE)?
Development of graduate attributes	<ul style="list-style-type: none"> Are there synergies with employability initiatives or the work of a employability coordinator? In what ways are higher order graduate attributes being defined and embedded within curricula? Are discussions taking place as to what is distinctive about a graduate of this particular university?
Disciplinary factors	<ul style="list-style-type: none"> To what extent are disciplinary communities and perspectives incorporated in the embedding of research-teaching linkages within the organisation?

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10.3 Appendix 3: Research-Teaching Linkages discipline projects and project directors

Arts, Humanities and Social Sciences

Dr Vicky Gunn, University of Glasgow

Business, Management, Accountancy and Finance

Professor Mary Malcolm, University of Abertay Dundee

Engineering and the Built Environment

Dr Kate Carter, Heriot-Watt University

Health and Social Care

Professor Maggie Nicol, Queen Margaret University Edinburgh

Information and Mathematical Sciences

Dr Janet Hughes, University of Dundee

Life Sciences

Professor Kevan Gartland, Glasgow Caledonian University

Medicine, Dentistry and Veterinary Medicine

Mrs Julie Struthers, St Andrews University

Physical Sciences

Dr Simon Bates, Edinburgh University

Creative and Cultural Practice

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Additionally, as part of the work in support of the Enhancement Theme, four international visitors ran a series of well-received sector-wide workshops and seminars at QAA and in various Scottish HEIs. The visitors were Associate Professor Angela Brew (Sydney), Dr Simon Barrie (Sydney) Brad Wuetherick (Alberta) and Dr Calvin Smith (Griffith). We are indebted to them for the time, commitment and ideas that they each contributed.

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Institutional contacts

Professor Naren Barfield, Glasgow School of Art

Professor Neil Blain, University of Stirling

Dr James Bown, University of Abertay Dundee

Professor Jim Boyle, Strathclyde University, Glasgow

Dr Stephen Broad, Royal Scottish Academy of Music and Drama

Professor Malcolm Crowe, University of the West of Scotland

Dr Alan Davidson, The Robert Gordon University

Mr Alan Ducklin, University of Edinburgh

Mrs Shirley Earl, Napier University

Dr Vicky Gunn, University of Glasgow

Professor David Kirk, Queen Margaret University, Edinburgh

Professor Allison Littlejohn, Glasgow Caledonian University

Dr Janet MacDonald, Open University

Professor Brent MacGregor, Edinburgh College of Art

Dr Phil Marston, University of Aberdeen

Professor Bob Matthew (formerly University of Glasgow)

Dr Axel Miller, UHIMI

Dr Colin Milligan, Glasgow Caledonian University

Dr Julian Randall, University of Aberdeen

Dr Karen Smith, Heriot-Watt University

Dr Kate Tedford, University of the West of Scotland

Dr Lorraine Walsh, University of Dundee

Professor Dale Walters, Scottish Agricultural College

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